NOVEMBER, 1954 Vol. 43, No. 9

Industrial Arts and Vocational Education

The Shop Teachers' Professional Magazine

SO EASILY HARMED . . .

The wings of a butterfly or moth that lift it above things that creep on earth are delicate, fragile, so easily harmed. If they are bruised by rough and crude handling, the creature is crippled, its beauty destroyed.

So with the wings worn by every boy in every classroom, that would lift him above creatures that merely creep. These wings, fashioned of fancy and dreams, veined with hope and an urgency toward future manhood, are delicate, fragile, easily marred. When harmed, they tumble their possessor maimed and crippled back to earth.

And every educator worthy of the name knows this, knows the delicate touch he must use if the wings are to be strengthened so they can lift the boy not toward fancy but toward achievement the greater because it is in part compounded of dreams and unmarred hope.

Photo Underwood & Underwood

Such an educator goes in part along the way, pointing it out as did the angel to Dante; pointing to the heights beyond, how they may be climbed and not ever indicating doubt or fear or insincerity.

The goal is good, the work is good, the tools are good; no inconsistency ever. For who would break this chain of logic by permitting *for example* the use of drawing instruments in a class in mechanical drawing that by their very cheapness and tawdriness undermine all the educator is trying to do? Certainly no instructor who senses the shifts by which good is turned into bad, or weakness into strength.

EUGENE DIETZGEN CO.

Chicago · New York · San Francisco · New Orleans · Los Angeles
Pittsburgh · Washington · Philadelphia · Milwaukee

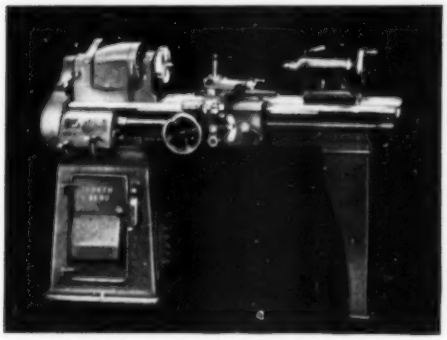
Dealers in All Principal Cities

DIETZGEN

EVERYTHING FOR DRAFTING
SURVEYING AND PRINT-MAKING

You Get More In A SOUTH BEND

These ten 13" South Bend Lathes have been in constant use for ten years and are still in excellent condition. Kirkman Vocational High School, Chattanooga, Tenn.



South Bend 13" x 4' Quick Change Gear Lathe – less electrical equipment f.o.b. factory – $1460.

You get more in South Bend Lathes for they are built to give more. Every one is designed for industrial production work which provides a degree of accuracy and dependability far in excess of the needs of school shops. That is why they keep running year-after-year with a minimum of attention and expense.

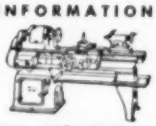
Yet, they have a simplicity of design and operation, plus exceptional ruggedness, that make them unsurpassed for training purposes. Follow the lead of smart educators everywhere and take advantage of the "bonus performance" that you get in all South Bend machine tools.

Compared with our costs
OUR PRICES ARE LOWER
than they were back in 1941

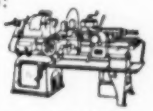
Prices are closely tied to costs. Costs are still rising. Buy now before increased costs necessitate higher prices.

PLEASE SEND INFORMATION CHECKED:

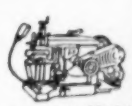
☐ 9" and 10" BENCH LATHES


☐ 10" to 16-24" FLOOR LATHES

☐ DRILL PRESSES


☐ ½" & 1" Collet TURRET LATHES

☐ TOOL GRINDERS


☐ 7" BENCH SHAPERS

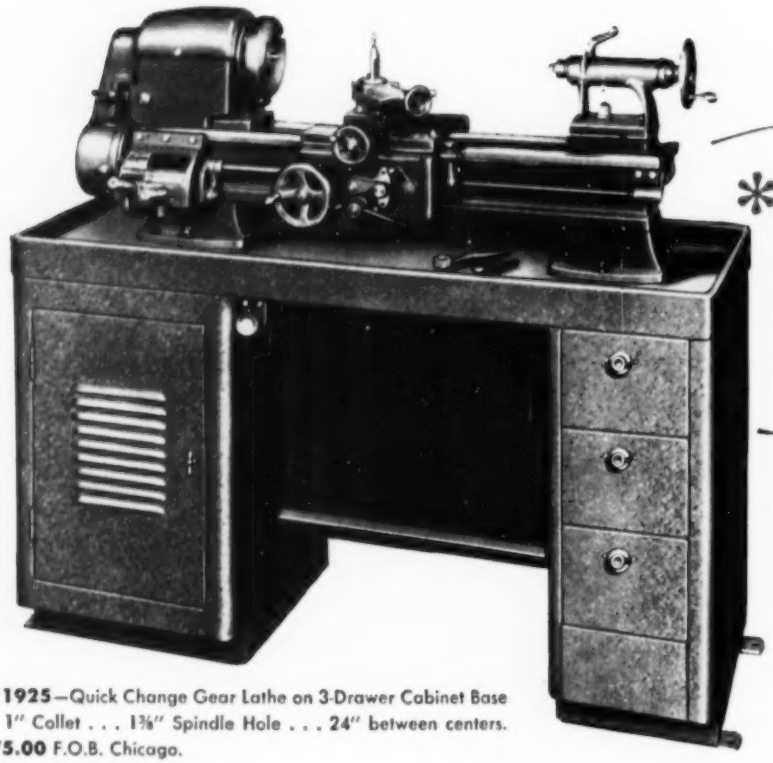
Name _____ School _____

Street _____ City & State _____

Building Better Tools Since 1906 • SOUTH BEND LATHE • South Bend 22, Indiana

Industrial Type Projects

Are easily handled in school shops on this 11" swing Logan Lathe*



* *One of the many in the complete Logan Line of 9", 10", 11" and 12" swing Lathes, and 8" Shapers.*

No. 1925—Quick Change Gear Lathe on 3-Drawer Cabinet Base . . . 1" Collet . . . 1⅜" Spindle Hole . . . 24" between centers. **$875.00** F.O.B. Chicago.

Student interest in shop work is sharply stimulated by the wide range of challenging projects this 11" lathe permits. With its 1" collet capacity, 1⅜" spindle hole and 24" centers, the "1925" turns work of substantial size. Furthermore, it enables your students to learn on one of American industry's standard modern lathes.

Advanced design and rugged, accurate, safe construction make the 1925 an ideal training lathe. The spindle revolves on preloaded *ball* bearings of extreme precision that need no adjustment for any speed in the full range of 45 to 1500 rpm. The rugged, balanced special alloy bed has two V-ways and two flat ways precision ground. The automatic apron, double-walled and friction-free, with spline-driven power cross feed, has a convenient, lever-operated disc type clutch. V-belt drive, headstock, countershaft and motor are enclosed. Controls and switches are easily accessible. The low price, resulting from efficient production in the modern Logan plant, places the 1925 within range of the modest school budget.

Brief Facts

Collet Capacity, 1"
Spindle Hole, 1⅜"
Swing over bed, 11⅛"
Center Distance, 24"
Bed Width, 6 15/16"
Ball Bearing Spindle
16 Spindle Speeds, 45 to 1500 rpm
Double V-belt Drive for extra power to spindle is completely enclosed
Threads—48 selections, RH or LH—4 to 224 per inch

Write for the Logan Lathe Catalog

Logan ENGINEERING CO.
Lawrence and Lamon Avenues, Chicago 30, Illinois

LOOK TO Logan FOR BETTER LATHES AND SHAPERS

NOVEMBER
1954

VOL. 43 NO. 9

Industrial Arts and Vocational Education

The Shop Teachers' Professional Magazine

Published on the 15th of the month preceding the date of issue by THE BRUCE PUBLISHING CO., 400 North Broadway, Milwaukee 1, Wis. • CENTRAL OFFICE: 20 North Wacker Drive, Chicago 6, Ill. • EASTERN OFFICE: 225 Broadway, New York 7, N. Y.

★ ★ ★ ★

This Month's Cover

The picture chosen for this month's cover was sent to us by Dr. Louis V. Newkirk, director, division of industrial arts at Chicago, who taught a course in elementary industrial arts and a course in general shop at the Utah State Agricultural College, Logan, Utah, this past summer.

The picture shows students from the elementary industrial arts class viewing a model of a dairy farm which was developed in connection with a unit of study for the second grade. Logan, Utah, is located in Cache Valley where the dominant industry is dairying. The photograph was taken by Fred R. Pryor, a student.

Professor William E. Mortimer is head of the industrial education department.

Most of the men are graduate students and veterans of World War II. Pictured, from left to right, are: Sherman L. Nay, John O. Whitaker, Ned R. Jackson, Kent Randall, George Galloway, Louis V. Newkirk, teacher, R. LaMar Larsen, Dorothy W. Hann, Beverly R. Schutz, James L. Hendrickson, Walter E. Ulrich, and Andrew C. Baggs.

★ ★ ★ ★

Entered January 2, 1914, as Second-Class Mail Matter at Milwaukee, Wis., under Act of March 3, 1879. **Copyright, 1954, by The Bruce Publishing Co.** **Title registered as Trade Mark in U. S. Patent Office, November 25, 1930. Published monthly except during July and August.**

Subscription Information. — Subscription price in the United States, U.S. possessions, and Canada, $3.00 a year, payable in advance. In all foreign countries, $3.75. Copies not more than three months old, 35 cents; more than three months old, 50 cents.

Discontinuance. — Notice of discontinuance of subscription must reach the Publication Office in Milwaukee, at least fifteen days before date of expiration. Notices of changes of address should invariably include the old as well as the new address. Complaints of non-receipt of subscribers' copies cannot be honored unless made within fifteen days after date of issue.

Editorial Contributions. — The Editor invites contributions bearing upon Industrial Arts, Vocational Education, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for upon publication. In all cases manuscripts should be accompanied by full return postage.

Articles Indexed. — The articles contained in the Magazine are regularly indexed in "The Readers' Guide to Periodical Literature," and "Education Index."

CONTENTS

The Crisis in Vocational Education ..... *William T. Bawden* 295
The Crisis in All Education ..... *William F. Rasche* 297
Making the General Shop Effective ..... *Amos D. Coleman* 299
Leaders in Industrial Education ..... *William T. Bawden* 302
Editorials 304
School of Many Skills, Quito, Ecuador ..... *Carlos Davila* 305

Problems and Projects

Reclaiming Window Sashes ..... *Joseph Longo* and *Robert Cota* 307
The Place of a Production Job in Industrial Arts ..... *Robert Lento* 307
Magazine Rack ..... *Louis Barocci* 308
The Development of the Loom ..... *Sheldon W. Cole* 309
Projection Box ..... *Walter Wilson* 312
Lamp and Shade with Tapped Copper Panels ..... *Harry S. Brown, Jr.*, and *Kenneth Thompson* 313
Scale Model of a Planned Home ..... *Andrew P. Grabowski* 315
An Improved Method of Explaining Triangulation ..... *John S. Krempa* 316
Locating Screw Holes for Hinges ..... *Ray C. Doane* 317
Ford V-8 Engine Stand ..... *Henry F. Kleemeyer* 317
Project Design for Teachers ..... *Alexander F. Bick* 317
Reading Desk ..... *R. W. King* 319
The Bookmark of the Month ..... *Herbert L. Foster* 320
Combating Theft and Vandalism in School Print Shop ..... *David Carl Goldstein* 321
Drafting Table Book Rest ..... *Roland J. Krogstad* and *Clarence Sebranke* 322
Are Glue Joints Strong ..... *Oscar H. Lee* 22A
Tin-Can Chicken or Pet Feeder ..... *J. W. Bollinger* 22A
A Tip for Sheet-Metal Workers ..... *J. H. Bailey* 24A
Check List for Planning and Evaluating Tool Panels ..... *Paul N. Wenger* 24A
Teachers' Colleges Not Confined to Preparing Teachers Only ..... *J. Howard Kramer* 26A
I Believe in the United States of America ..... *Richard J. Hoffman* 27A

Association News 4A
Personal News 6A
News Notes 27A
New Publications 28A
Shop Equipment News 33A
Descriptive Material 40A

Association News

COMING CONVENTIONS

Nov. 4–5. Wisconsin Industrial Arts Association, at Public Museum Auditorium, Milwaukee, Wis. Secretary, Leo R. Ebben, 519 Church St., Kohler, Wis.

Nov. 5–6. New England Industrial Arts Teachers Association, at Hotel Carpenter, Manchester, N. H. Secretary, Arthur I. Martin, State Teachers College, Gorham, Me.

Nov. 6–7. Industrial Arts Association of Pennsylvania, at Penn Bedford Hotel, Bedford, Pa. President, J. Philip Young.

Nov. 11–13. Mississippi Valley Industrial Arts Conference, at LaSalle Hotel, Chicago, Ill. Chairman, Dr. Verne C. Fryklund, president, The Stout Institute, Menomonie, Wis.

Nov. 13–19. Adult Education Association of the U.S.A., at Hotel Statler, St. Louis, Mo.

Dec. 3–7. American Vocational Association, at St. Francis Hotel, San Francisco, Calif. Secretary, M. B. Mobley, 1010 Vermont Ave., N.W., Washington, D. C.

SHELDON
CHICAGO U.S.A.

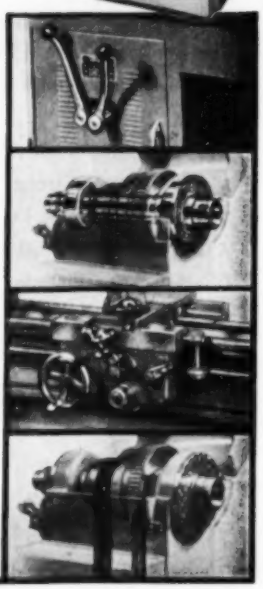
Important ★
above all else in school lathes

★ **SHELDON SAFETY**
. . . all belts, pulleys, countershafts, gears and motors are completely enclosed. Speed changes and gear-ratio changes are made by external shift levers.

★ **SHELDON PRECISION**
. . . "Zero-Precision" Tapered Roller Spindle Bearings (the absolute in accuracy) permit student work to ten-thousandths of an inch, and hold this accuracy without constant maintenance.

★ **SHELDON CONTROLS**
SHELDON-taught students are ready to operate standard industrial lathes—are familiar with standard controls and the "big lathe feel".

★ **SHELDON CAPACITY**
The extra swing and greater collet capacity increase the range of possible student projects—from the "playing store" group to the practical. The extra power to the spindle, the speed range, weight and strength of SHELDON Precision Lathes permit heavy cuts, spinning and demonstration of correct use of new cast-alloy and carbide-tipped cutters.



Built by modern methods, with the finest machine-tool special machinery, on a continuous production line basis, these better lathes cost little more than ordinary school type lathes. *Write for Catalog*

SHELDON MACHINE CO., INC.
4244 North Knox Ave., Chicago 41, Illinois

NEW ENGLAND INDUSTRIAL ARTS TEACHERS ASSOCIATION

Following out the rotation system of convention locations, the New England Industrial Arts Teachers Association have announced their seventeenth annual convention to be held at Manchester, N. H., in the Hotel Carpenter on Friday and Saturday, November 5 and 6, 1954.

Personnel from the New Hampshire schools are, therefore, in charge of the convention details and a committee is already at work to provide a program which will prove educational, interesting, and enjoyable for all.

The theme of the convention — "Industrial Arts Builds Better Citizens" — with emphasis on what youngsters do with their spare time, will be implemented by the guest speaker, Romeo E. Collin, national executive director of Junior Achievement, Inc. Locally, John Pillsbury, well known in State House circles, will be the toastmaster for the occasion. — *B. R. Smith.*

NORTHEASTERN OHIO INDUSTRIAL ARTS ASSOCIATION

At a recent meeting of the Northeastern Ohio Industrial Arts Association, Forest Swank of Loudonville, Ohio, was elected president; Percy E. Nead of Elyria, Ohio, was elected vice-president; William Heasley of Cuyahoga Falls, Ohio, was retained as secretary; and Peter Gulgin of Youngstown, Ohio, was elected treasurer.

♦ The West Virginia Industrial Arts Association will hold its semiannual meeting at Fairmont State Teachers College, Fairmont, W. Va., on November 5 and 6, 1954. The host will be Fairmont State Teachers College, Dr. John W. Pence, president. General chairman of the conference will be Prof. C. W. Johnson, head, industrial-arts department, Fairmont State Teachers College.

The speaker will be Dr. Walter Williams, state director of vocational education and industrial-arts consultant, Tallahassee, Fla. On Friday, November 5, he will deliver a message to the student body at the College convocation. That same evening the Epsilon Pi Tau will hold a banquet and fellowship meeting.

Saturday, November 6, will feature Dr. Williams' address to the entire conference. Visitations and shop demonstrations will follow. Later in the day Arthur Stroud, head of sales and promotion, Monongahela Power Company, will give an illustrated talk on "Better Lights for Better Sight."

Presiding throughout the meeting will be the president of West Virginia Industrial Arts Association, David Groves.

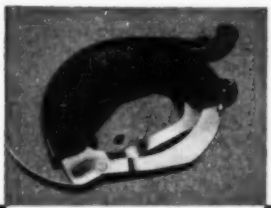
All persons interested in industrial arts are cordially invited to attend. Mail reservations to Anthony Kolitsch, Philippi, W. Va. — *Chas. R. Cather.*

♦ At the spring meeting of the Birch Coulee Industrial Arts Association of Minnesota, Floyd Wursetter of Gaylord, Minn., was elected president and Curtis Johnson of Clarkfield, Minn., was elected secretary-treasurer. The fall and winter meetings were set for September 18, 1954 and December 4, 1954, respectively. — *Curtis M. Johnson, Secretary.*

♦ The fall meeting of the American Society of Mechanical Engineers was held September 8–10, 1954, at Hotel Schroeder, Milwaukee, Wis.

Milwaukee's ASME Section celebrated its 50th anniversary at the same time.

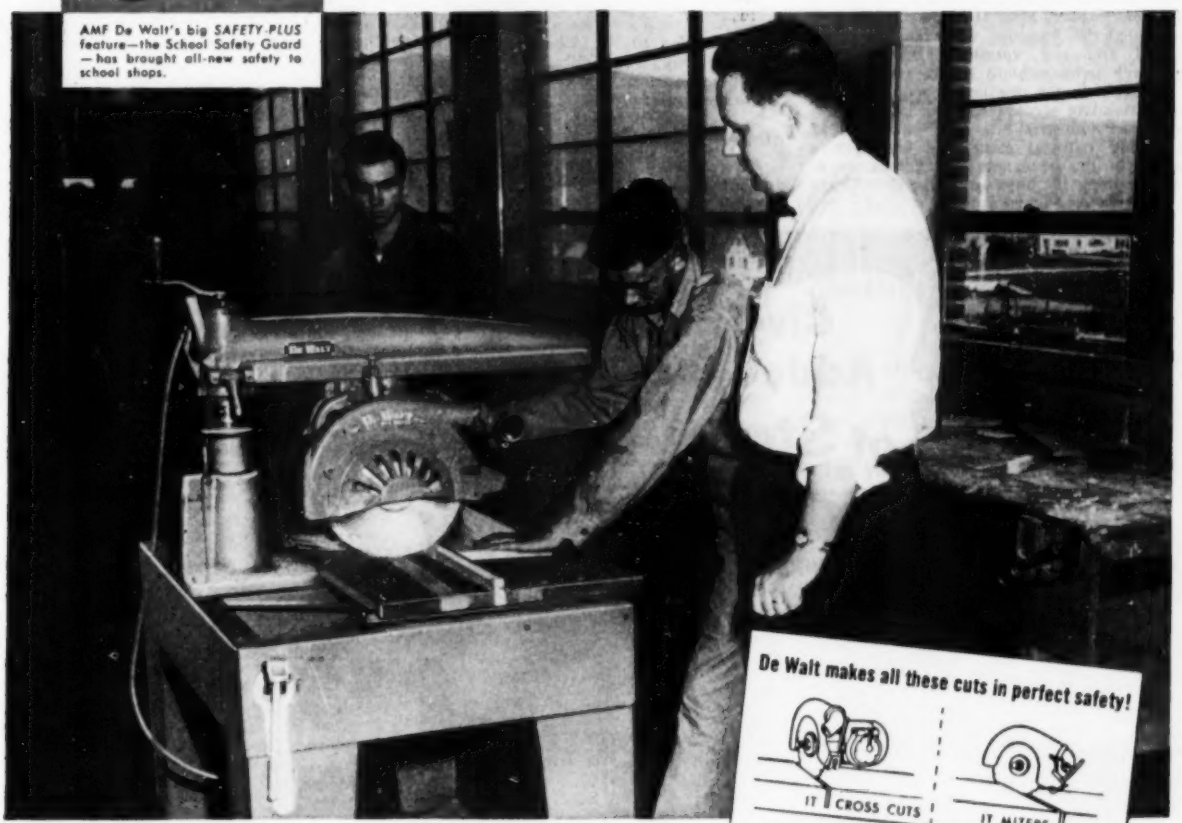
"Man's eyes were made for outdoor seeing, not for indoor concentration on work within arm's length." — *Dr. E. H. Westland,* Pittsburgh, Pa., optometrist.

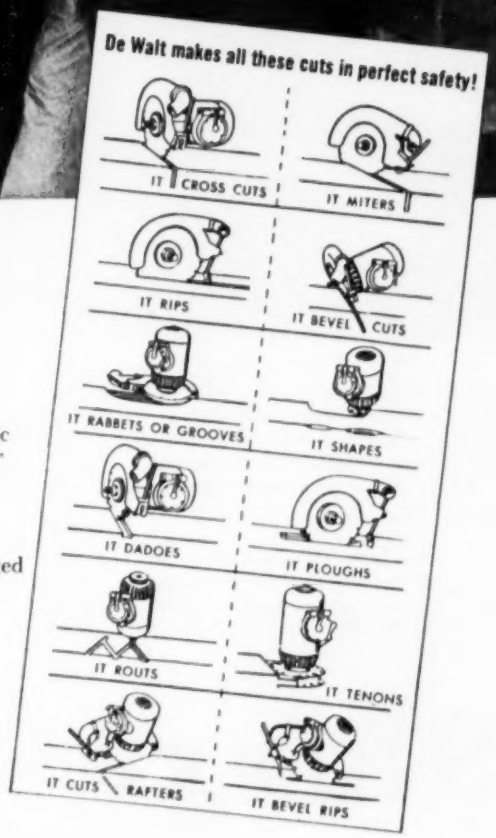


"I'm really sold on AMF De Walt as a safe multi-purpose tool!"

says E. F. Wilson, Instructor, Vocational Agriculture Dept., George Wythe High School, Wytheville, Va.

AMF De Walt's big *SAFETY-PLUS* feature—the School Safety Guard—has brought all-new safety to school shops.





"Like most instructors, I was wary about having my students work with a multi-purpose tool. But when I saw how safe AMF De Walt® is, I got one right away. Now my students can learn as many as 15 different operations.

"And I don't worry about their safety, thanks to features like AMF De Walt's Blade and Arbor Guard, Anti-kickback Device for all operations from ripping position and the new Automatic Safety Carriage Lock. That's why I'm really sold on AMF De Walt."

Yes, AMF De Walt is *safe* and *versatile*. What's more it's easiest to teach and learn. Makes all cuts quickly . . . accurately.

Write us c/o Dept. IA-11-54, or your AMF De Walt dealer for illustrated catalog. Send for two 16 mm. movies on AMF De Walt—ideal for classroom instruction.

De Walt Inc. Lancaster, Pa.

DE WALT

POWER SAWS

Subsidiary of **AMERICAN MACHINE & FOUNDRY COMPANY,** *New York*

IN CANADA: De Walt Canada Limited, Guelph, Ontario

Personal News

JOSEPH M. FLEMING TESTIMONIAL DINNER

The Trade and Industrial Education Association of Pittsburgh, Pa., held a testimonial dinner on Friday, May 21, 1954, in honor of Dr. Joseph M. Fleming, who has served industrial arts and vocational education in Pittsburgh public schools for 42 years.

He has been the driving force in many of the outstanding accomplishments in the vocational and industrial-arts field on the local, state, and national scene. He has been a pioneer in the education of veterans, vocational training for boys and girls, distributive education, and practical nurse training. Dr. Fleming has worked closely with industry in setting up training classes.

He has taught summer sessions at Yale University and Penn State; has been on the teacher-training staff at the University of Pittsburgh since 1928, and has also been chairman of the trade competency testing program at the University of Pittsburgh for the past 12 or more years.

He has been director of Vocational and Industrial Arts Education since April 1, 1945. Before coming to the Administration Building as director, Dr. Fleming was teacher, vocational counselor, vice-principal, principal, and senior supervisor.

INDUSTRIAL ARTS MAN HONORED

Albert Kosloff, well known as an instructor in graphic arts, and a writer of two books, *Elementary Silk Screen Printing* and *Mitography*, besides many articles for professional and trade publications, has recently been chosen by the Lake View District, Chicago, Ill., as the "Outstanding Neighbor" for September, 1954, for his outstanding service in the graphic arts.

He has been an industrial-arts teacher, the head of a technical department, a placement counselor, and vice-president of "Personnel and Guidance" for the Illinois Industrial Education Association. He is now assistant principal of the South Shore High School, Chicago, Ill.

DR. M. NORCROSS STRATTON RETIRES

Dr. M. Norcross Stratton, who has served for 36 years in the Massachusetts State Department of Education in an outstanding manner, has retired.

He was honored by the Massachusetts Vocational Association and the National Association of State Directors of Vocational Education at a testimonial luncheon in Boston on May 8, 1954.

NATHAN B. GILES RETIRES

Nathan B. Giles, agent for the Central Region and for the Western Region as well as Assistant Chief of the Trade and Industrial Education Branch of the Division of Vocational Education, Office of Education, Washington, D. C. retired on July 1, 1954.

♦ Dr. Harold G. Wilm, associate dean for biological sciences and graduate studies at the State University of New York of Forestry, Syracuse, N. Y., is the United States delegate at two international meetings in Europe.

Dr. Wilm left on September 8 for Rome, Italy, to attend the General Assembly of the International Union of Geodesy and Geophysics and the International Association of Hydrology.

At Nancy, France, he represents the United States at the sessions of the Permanent Committee of the International Union of Forest Research Organizations.

Dr. Wilm is the author of over 60 technical and semipopular articles on forestry, hydrology, meteorology, and engineering.

♦ Clarence A. Fahs retired in June, 1954. He had been machine-shop instructor for 33 years in Wilmington, Del., public schools.

A testimonial dinner was given him by his co-workers and friends, who also presented him with a gold watch.

He taught first at the Wilmington Trade School, and later at the Brown Vocational School.

♦ Louis M. Sasman, chief of Vocational Agriculture for the Wisconsin State Board of Vocational and Adult Education for the past thirty years, has been granted a two-year leave of absence to serve as specialist in vocational agriculture in Egypt.

♦ George P. Deyoe, professor of agricultural education at the University of Illinois, was honored at Atlanta, Ga., on September 29 at the annual convention of the New Farmers of America, composed of Negro youth enrolled in vocational agriculture in the southern states.

Professor Deyoe has given much to vocational education in agriculture for Negroes, and for that reason he received a degree of Honorary Superior Farmer from the organization.

♦ Charles McGuinnes who has taught day trade radio and television repair at Kansas State Teachers College, Pittsburg, Kans., for several years, has accepted a position at Park College, Parkville, Mo., to teach science.

♦ Bill Wilkinson, vice-president of the Industrial Arts Association of Pennsylvania, has been appointed to a three-year term on

(Continued on page 8A)

You know what it means to a boy when he feels he is doing *real* work with *real* tools. He has an added incentive to *work* and to *think*. He's off to a good start . . . enthusiastic . . . eager to learn. It's a pleasure to have him in your class.

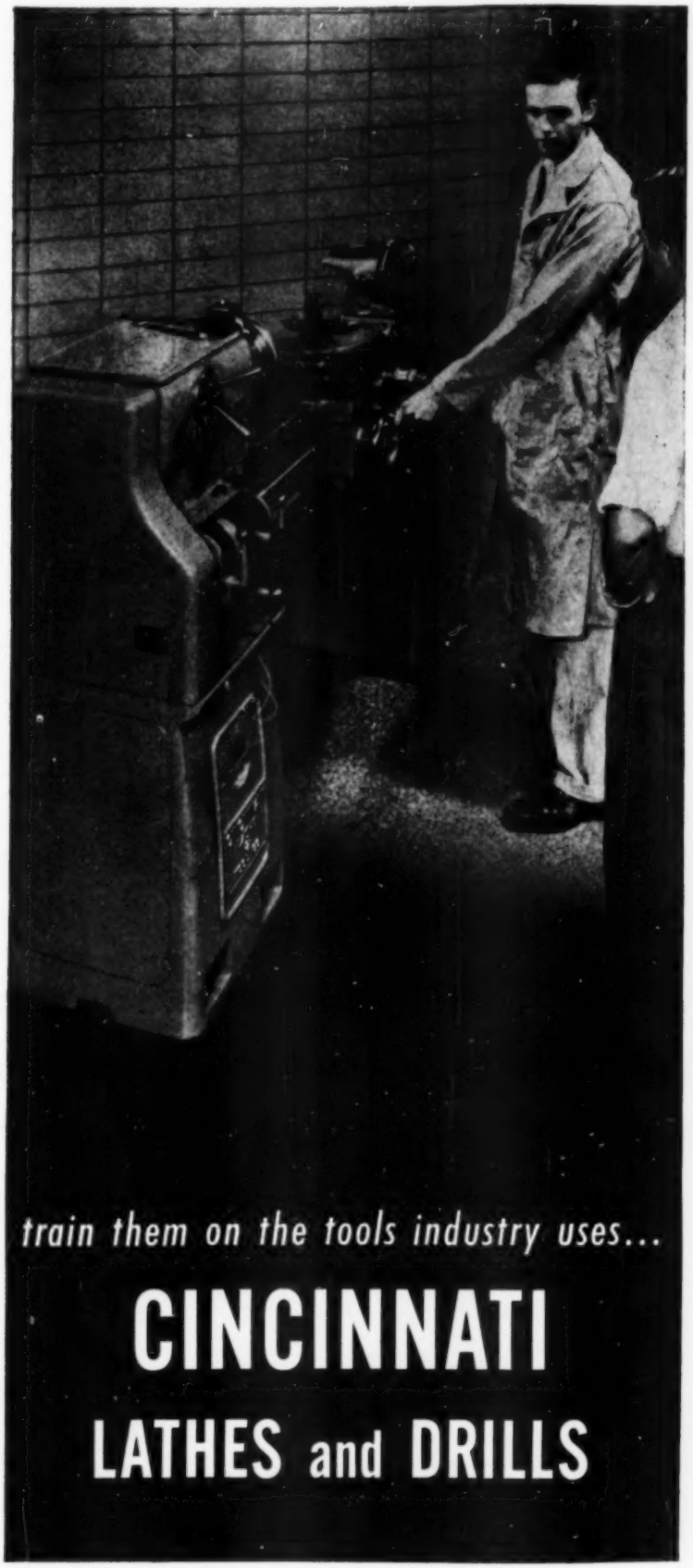
Give your boys this incentive. In your purchases of tools for your shop classes, buy for your boys the same kind of tools they will eventually buy for themselves . . . STARRETT TOOLS.

THE STARRETT BOOK FOR STUDENT MACHINISTS

Prepared in co-operation with leading vocational training experts, written in simple shop language, it provides the information students need about tools, machines and modern metal working methods. 200 illustrations, 30 reference tables. Available through STARRETT tool dealers — $1.50 per copy. Address Dept. CE.

Starrett®

"WORLD'S GREATEST TOOLMAKERS"



Now Cincinnati offers a full-size lathe at a price to suit school budgets

You'd like to train your students on the tools industry uses. You want to send them to their first jobs unawed by all-geared head lathes . . . by a wide range of spindle speeds . . . or by direct-reading shifting and precision spindles. *And now you can!*

The new Cincinnati 12½" x 18" Tray-Topette provides all the speeds, all the feeds, all the precision of a quality production lathe at a price to suit school budgets—$1,868.25 including motor and control, f. o. b. factory.

Compare the price of the Tray-Topette with that of a typical "school lathe" and then check all the extra features it offers: Cincinnati's exclusive Color Match Speed Selector. Ground bedways. Totally enclosed quick change box and double-walled apron, both with automatic lubrication. Oil shot pump lubrication of ways and cross slide. Hardened gears in all three transmissions. 18", 24", 30", 36", or 42" center distances.

Get all the facts now, plus the name of your nearby Cincinnati dealer, by writing for Catalog T-118. There's no charge or obligation. Cincinnati Lathe & Tool Co., 3210 Disney, Cincinnati 9, Ohio.

PERSONAL NEWS

(Continued from page 6A)

the advisory council of Ford Motor Company's Industrial Arts Awards Program.

♦ A. J. OSTERGAARD has joined the faculty of the College of Engineering, Washington University, St. Louis, Mo., where he will be instructor of engineering drawing and descriptive geometry.

He was formerly head of the vocational drafting department of the Technical High School at Omaha, Neb.

♦ DR. STUART A. ANDERSON, for several years technical director of vocational education, Institute of Inter-American Affairs, Lima, Peru, is now director of teacher training and professor, Eastern Illinois State College, Charleston, Ill.

♦ DR. ATHELSTAN SPILHAUS, dean of the Institute of Technology at the University of Minnesota, Minneapolis, Minn., has been retained by Minneapolis-Honeywell Regulator Company as a consultant in the fields of engineering and research.

♦ ELGIN WOLLMAN, assistant educational director for the Society for Visual Education, Inc., Chicago, Ill., has been appointed Midwest District Sales Manager.

He has been dean of Minnesota's Institute of Technology since 1949, and also is consultant to a number of government and military agencies, including the Department of Defense and the Weather Bureau.

♦ HARRY T. BELLAMY has been sent to Pakistan by Armour Research Foundation of Illinois Institute of Technology to assist in the production of refractory brick at a manufacturing plant in Malakwal.

Mr. Bellamy developed one of the earliest refractory insulating bricks to be used in direct contact with the source of heat — a practice that since has become widespread.

He will serve as refractory technologist to the North Western Railway of Pakistan, which owns the plant.

♦ RAY S. LINDENMEYER received the doctor of education degree in industrial education at the June 7 convocation of Bradley University. The title of his dissertation was "A Scientific Approach to Technical Problem Solving with Application to Two Technical-Educational Problems."

Dr. Lindenmeyer is associate professor of mechanical engineering at Northwestern University and is the director of the metal processing laboratories. He is also the technical editor of *Science and Mechanics*.

♦ WARD W. SWAIN, counselor, Washington Vocational High School, Pittsburgh, Pa., was appointed principal of Allegheny Vocational High School, effective May 4, 1954.

♦ ERCOLE A. LIBERATOR, teacher, Allderdice High School, Pittsburgh, Pa., was made counselor at Washington Vocational High School.

♦ PAUL R. BOWER, vice-principal, Fifth Avenue High School, Pittsburgh, Pa., was advanced to principal, Washington Vocational High School, effective August 19, 1954.

♦ HARRY B. SINGER, teacher, Westinghouse High School, Pittsburgh, Pa., has been appointed vice-principal of Fifth Avenue High School, effective September 2, 1954.

♦ EVERETT W. CASE, principal, Allegheny Vocational High School, Pittsburgh, Pa., retired on May 1, 1954. Mr. Case was with the Pittsburgh schools for 41 years.

♦ DR. ALEXANDER BOOTH retired August 1, 1954, as principal of Washington Vocational High School, Pittsburgh, Pa. Dr. Booth is finishing his 36th year with the board.

♦ DAVID C. ELLINGER, principal, Connelley Vocational High School, retired on July 9, 1954. Mr. Ellinger was with the Pittsburgh schools for thirty-six and a half years.

♦ FRANCIS J. COYTE, counselor, Connelley Vocational High School, Pittsburgh, Pa., retired June 25, 1954. Mr. Coyte came to Connelley when it opened in 1930. He had formerly taught at the Ralston school — altogether 36 years in Pittsburgh.

♦ PAUL KENNEDY, related drawing teacher, Connelley Vocational High School, Pittsburgh, Pa., retired June 25, 1954. Mr. Kennedy was with the Pittsburgh public schools for 33 years.

♦ CHARLES F. HOFFMASTER, assistant director, Section on Vocational and Industrial Arts Education, Pittsburgh, Pa., was appointed director of vocational and industrial arts education on July 1, 1954.

♦ OVERTON R. JOHNSON has been appointed professor of agricultural education at the School of Agriculture, Virginia State College, Petersburg, Va. Mr. Johnson was formerly a graduate assistant in agricultural engineering at Cornell University, Ithaca, N. Y.

♦ WALTER J. ELDER, teacher trainer in distributive education at Kansas State Teachers College, Emporia, Kans., resigned to go to Southern Illinois University at Carbondale, Ill., as a member of its vocational education division of institutes. He will operate a college-level co-operative program with trainees placed in department stores all over the state. His students will work full time in stores for a part of the year, then come back to the campus for further training.

♦ AARON ADAMS has accepted the position recently vacated by Chelsa Bailey. Prof. Bailey, who has served on the vocational education staff of the Teachers College, University of Cincinnati, has accepted a position with the Ohio Merchants Institute.

Mr. Adams will be consultant to area industries in a leadership development service sponsored jointly by the University and the Trade and Industrial Education Service, Division of Vocational Education, Ohio State Department of Education.

THE *Nichols* TOOL ROOM MILLER

"the miller that uses its head!"

A valuable accessory is the Nichols Heavy-Duty Vertical Milling Attachment. Takes full 1½ H. P. up to 2000 R. P. M. (So precise, some shops use it for jig boring!)

The unusual versatility and extra capacity of this model make it extremely useful for the tool room. Because it is equipped with the "rise-and-fall" spindle, it can perform not only conventional precision milling, but also facing, boring, key seating, contour milling and other operations. Both longitudinal and transverse feed screws are fitted with hand wheels and extra-large adjustable micrometer dials with easy-to-read graduations. This model is especially useful because of its compactness, generous capacity and ability to handle a wide variety of work to close tolerances — to "tenths" when desired!

CONDENSED SPECIFICATIONS

Table Working Surface	84" x 30"
Longitudinal Travel	19"
Transverse Travel	7"
Vertical Travel — Knee	13½"
Rise and Fall of Spindle	4½"
Selective Speed Ranges up to 5000 R. P. M.	
Weight	1250 lbs.

Write today for Nichols general catalog which describes the six models of Nichols Millers. A sound, color movie, "the Miller that Uses its Head" is available for free showing. May we reserve it for you?

MANUFACTURED BY W. H. NICHOLS COMPANY • WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS NICHOLS-MORRIS CORPORATION

76-S Mamaroneck Avenue White Plains, N. Y.

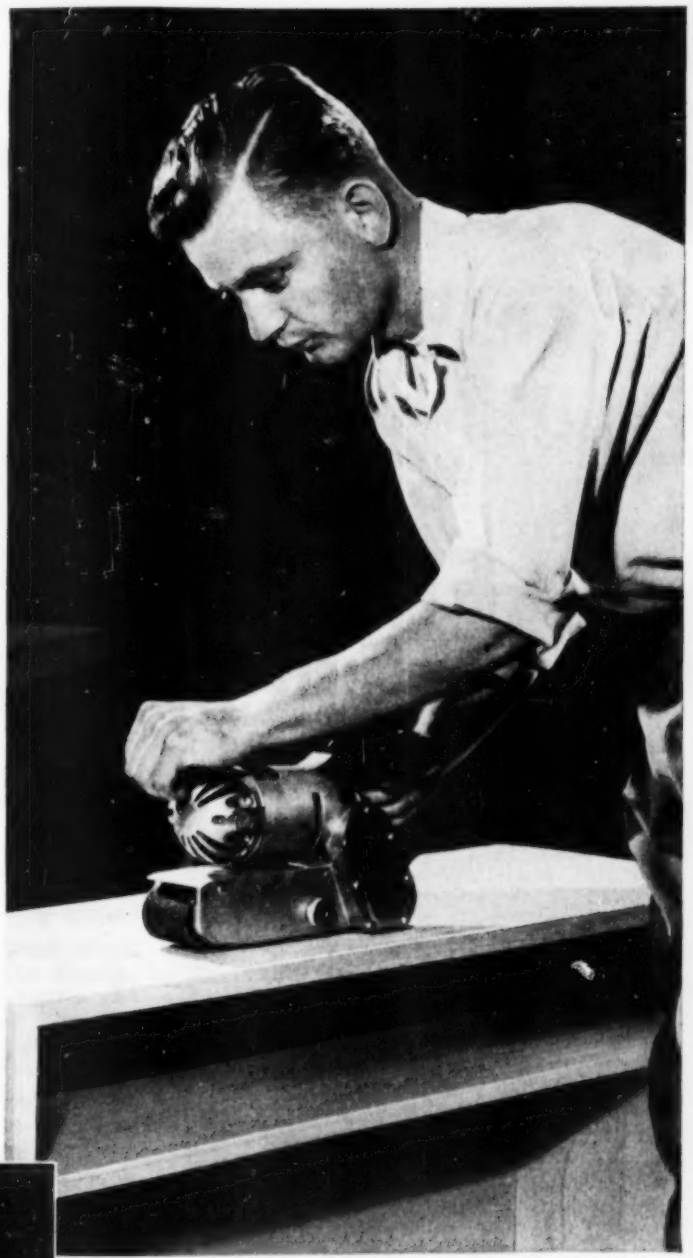
• For Student Training...
• For School Maintenance...

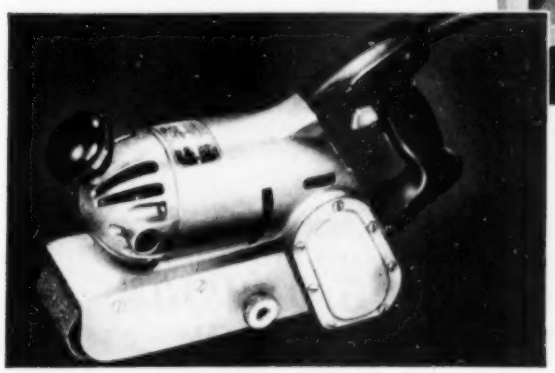
THERE'S NO FINER BELT SANDER THAN SKIL

Give your students the tool they'll use as professionals!

With a SKIL Belt Sander, it's easy to produce ripple-free professional finishes right from the start! Satin-smooth finishes that would take ten times as long to sand by hand. Preferred over other makes for training, because of better balance and design.

Ideal also for maintenance work—in refinishing blackboards or desks, chairs, tables and other school furniture, at low cost. Built to stand up years longer. Unequalled for rough and fine wood sanding—or for sanding plastics, compositions, metals.





OTHER SKIL BELT SANDERS

Model	Belt Width
448	3"
449 (with vacuum dust collector)	3"

Other SKIL Belt Sanders up to 4½" width.

◀ **A NEW, IMPROVED 2¼" SKIL BELT SANDER** to meet all requirements. Right side flush with belt edge to permit sanding next to uprights. Trigger switch. Precision-cut gears. Ball and sleeve bearings. Belt speed 750 feet per minute. Overall length 12". Net weight 9½ pounds. *MODEL 505.*

SKIL PORTABLE TOOLS

Made only by SKIL Corporation
formerly SKILSAW, Inc.
5033 Elston Avenue, Chicago 30, Illinois
3601 Dundas Street West, Toronto 9, Ontario
Factory Branches in All Leading Cities

SEE YOUR DISTRIBUTOR FOR COMPLETE INFORMATION OR CALL YOUR NEARBY SKIL FACTORY BRANCH OFFICE

The BIG SWING in School Shops is to CLAUSING Lathes for SAFETY + CONVENIENCE + DEPENDABILITY

CONDENSED SPECIFICATIONS

CAPACITY Swing: 12⅝" over bed; 12½" over saddle wings; 7½" over saddle. 24" — 36" — 48" between centers.

BED 7⅛" wide, 5⅛" deep. Two Vee, two flat ways and underside of bed are precision-ground.

THREAD RANGE 48 selections, 4 to 224 Standard, right or left.

SPINDLE SPEEDS Countershaft Drive, 8 (50-1300 R.P.M.) Variable Speed Drive, infinite (50-1400 R.P.M.).

POWER LONGITUDINAL FEEDS From .0012" to .009" (left or right) per revolution of spindle.

TAILSTOCK 1⅝" diam. ram, 3" travel. Ram graduated 0 to 3" by 1/16ths. No. 3 Morse Taper. 1" set-over.

COMPOUND REST Graduated 0 to 90° right and left. 2¾" travel.

TOOL POST Slot is 9/16" x 1-5/16" high. Takes ½" tool bits or tool holder for 5/16" tool bits.

Safety is one of many logical reasons why so many school shops are turning to the new CLAUSING "6300" Series 12" precision lathe! Its outstanding safety and convenience features make it the most practical lathe for teacher and student alike.

The CLAUSING headstock, outboard drive, variable speed control (optional), quick change gear box and double walled apron are *all fully enclosed*. There are *no exposed belts or gears* to catch fingers or clothing. The L-00 spindle nose is tapered key-locked type that *eliminates the danger of chucks or face plates coming off* when spindle is braked or reversed.

You can change spindle-drive belts without having to remove the spindle and *change spindle speeds without having to shift belts* — safety and convenience features you're sure to appreciate.

What's more, for Accuracy, Dependable Service and Economy these CLAUSINGS can't be duplicated at or near their price. A point-by-point comparison of their important design and construction features listed on the opposite page will show you why this is true.

Before you order another lathe for your school be sure to investigate these brilliant new CLAUSINGS at your nearest ATLAS-CLAUSING dealer's.

Write for fully illustrated catalog TODAY

WRITE FOR ILLUSTRATED LITERATURE TODAY!

CLAUSING DIVISION

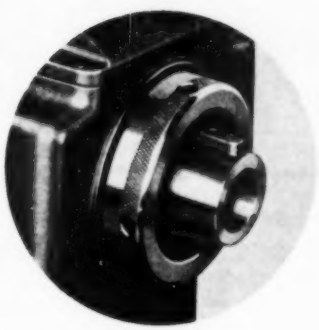
11-121 N. PITCHER ST. KALAMAZOO, MICHIGAN

Atlas CLAUSING Division Atlas Press Company

Atlas Press Company

Quality Machine Tools Since 1911

ATLAS WOODWORKING POWER TOOLS
ATLAS METALWORKING MACHINE TOOLS
CLAUSING HEAVY DUTY MACHINE TOOLS

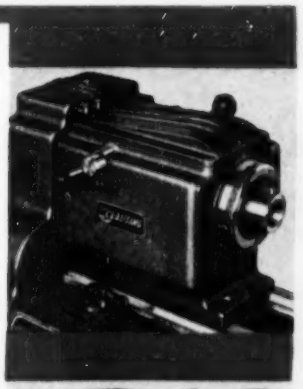


SAFEST SPINDLE

Spindle nose is tapered key-locked type — spindle can be reversed or braked without danger of the chuck's or face plates coming off. Spindle is forged precision ground steel. Nose is hardened and ground.

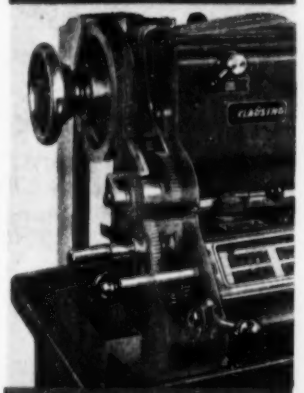
FULLY ENCLOSED HEADSTOCK

The thick-walled grey-iron headstock is fully enclosed and sealed as gears travel in bath of oil. Back gear controls are located outside the headstock. Students have no need to get inside headstock *and they can't!* Headstock features: "Zero-Precision" Timken tapered roller bearings . . . forged, precision-ground steel spindle with hardened nose, 1 3/8" bore and 1" collet capacity. Reverse gear lever is conveniently located on headstock.



FULLY ENCLOSED OUTBOARD DRIVE

Replacing belts is a quick, easy job — fully guarded spindle pulley mounted "outboard" — no need to disassemble headstock and spindle. And with the Variable speed drive (optional), an infinite number of speeds between 30 and 1400 RPM are available by merely turning a dial control — no belts to shift.



FULLY ENCLOSED QUICK-CHANGE MECHANISM

Quick-change gear box is fully enclosed for safety. It's sealed! All gears are 1/2" wide steel, entire mechanism runs in bath of oil. Exclusive override clutch prevents tooth damage by assuring proper meshing of stack gears in every thread or feed engagement. 7/8" lead screw turns on two Timken tapered roller bearings . . . shear pin prevents damage.

FULLY ENCLOSED AUTOMATIC APRON

Another totally enclosed member that gives you greater safety with CLAUSING. *Built-in safety lock* makes it impossible to engage feeds and half nuts at same time. Gears and shafts *run in bath of oil.* Power feeds are engaged by a positive clutch working thru worm and worm gear. Slot in lead screw drives cross and longitudinal feeds — split-nut feed is used for threading only.

CONVENIENT, HUSKY MT TAILSTOCK

Permanently attached swing type wrench (can't be lost) controls bed lock. Tailstock has a No. 3 MT ram with tang socket . . . holds tools without slippage. Tailstock casting alone weighs 26 lbs. Ram is ground steel — has long key guide that absorbs heavy torque loads — large coordinate-type lock. Ram is graduated 0 to 3" by 16ths. Bed wipers clean and oil the ways.

Good Tools Help Develop Better Students—Faster

Snap-on*

MASTER SUPREME WRENCH SET

For the school shop conducting automotive, aviation and farm equipment maintenance courses, this set provides the basic wrenches with which thousands of professional mechanics have started their tool kits. Because additional units of matching design can be added as needed this set will place your shop tool selection upon a firm foundation. It handles 7/16" to 1¼" hex nuts and provides a wrench handle for all types of work.

Write today for your copy of the new 104-page catalog of Snap-on tools . . . free to school officials and instructors.

SNAP-ON TOOLS CORPORATION
8074-K 28th Avenue, Kenosha, Wisconsin

Snap-on Tools
THE CHOICE OF BETTER MECHANICS

*Snap-on is the trademark of Snap-on Tools Corporation

Frank Paxton Lumber Co.
6313 St. John Ave., Kansas City, Mo.

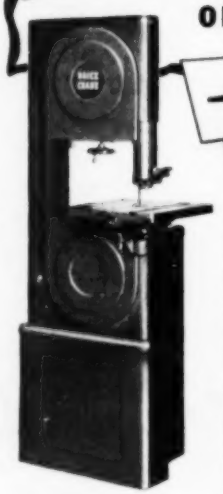
Please send your new 4-color catalog to the attention of_____

School_____

Address_____

City_____ State_____

The Most RUGGED OF ALL 14" BAND SAWS —by BOICE-CRANE



Ruggedest 14-inch Band Saw built. Welded one-piece steel frame just like giant 36-inch industrial band saws. Abusive service doesn't faze it. Wheels and blade entirely enclosed, except at the cutting point. Blade guides safely adjust by single control, even when running. Blade speed of 4100 feet per minute cuts hard woods like butter — reducing the hazards of low speeds which result in unsteady work feed. Higher blade speed cuts 2 to 4 times smoother too! That reduces sanding. ● Beltless super-safe direct drives available, as well as V-belt drive models. Motors and belt drives completely housed in sealed-in-steel compartment — safer, and out of the dust too! ● Cuts, sands, grinds any material . . accurately . . smoothly . . freely. ● From guide to work table: 7¾". Blade widths: 3/16", ¼", ⅜", ½" and ¾". Blade length: 98". The 15" x 15½" table tilts on 45° R., 10° L., double trunnions. ● 13½ inches from the blade to the guard, permits 27-inch diameter work. ● The wheels are strong but light, with a diameter of 14 inches and a face of one inch. Grease-sealed ball bearings. ● Over-all height of floor model; 67 inches.

12 MODELS — SINGLE & 8-SPEED BACKGEARED.

FREE!

Big New Catalog on Boice-Crane Woodworking Power Tools for Cutting — Shaping — Drilling — Finishing.

BOICE-CRANE COMPANY
932 Central Avenue Toledo 6, Ohio
☐ Please send free literature on Boice-Crane Band Saw.
☐ New 52-page Catalog No. 53 on entire line.

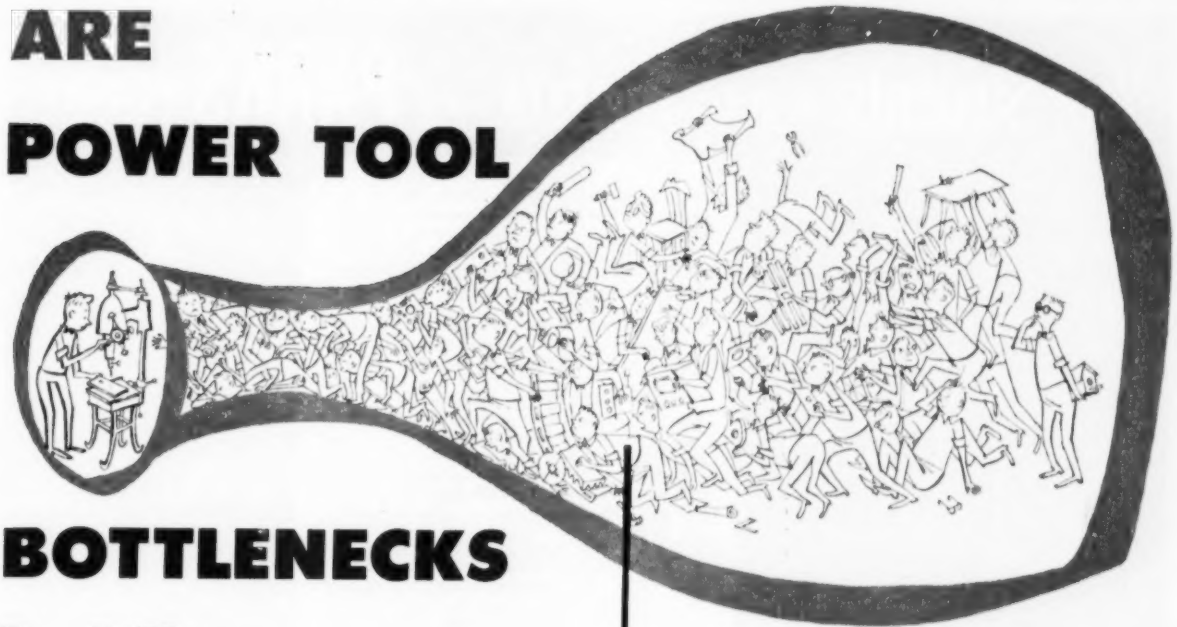
NAME_____

FIRM_____

STREET_____

CITY & STATE_____

ARE POWER TOOL BOTTLENECKS holding your students back?



NEW SHOPSMITH* Mark 5 Flexible Work Station is like a complete extra shop

Periodic overloads plague every shop instructor, block effective teaching techniques, slow students' progress.

New SHOPSMITH Mark 5—the only *flexible* power tool work station—virtually *doubles* the capacity of your power equipment. For with SHOPSMITH, you can convert an idle tool into the one most needed at the moment.

One minute, it can be a 9" circular saw . . . the next, a 12" disc sander, a 34" lathe or a 16½" floor or table model, vertical or horizontal drill press. New *Power Mount* makes it easy to add a jigsaw or jointer. And several SHOPSMITHS open a whole new approach to group instruction.

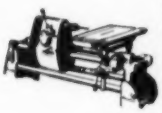
Here, then, is equipment you fit to your method of teaching, instead of vice versa. Here is a tool that compares in operation, accuracy, capacity and safety with any of the power tools in your shop. Here, too, are important exclusive features—Speed-Dial (just dial the speed to fit the job), Power Mount, chrome rust-proofing, 75 new features in all.

SHOPSMITH comes complete with built-in ¾-hp. motor and bench for only **$269.50.** Saw guard accessory, $11.95.

*T. M. Reg. U. S. Pat. Off. and foreign countries

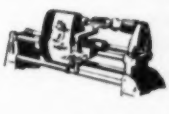
SHOPSMITH IS THE SAFEST POWER TOOL EVER DESIGNED!

From the first flick of the guarded OFF-ON switch, a score of SHOPSMITH safety features stand ready to protect the most awkward beginner. Speed-Dial gives exactly the right speed for any job. Belts and pulleys are safely enclosed. Miter Gauge Safety Grip keeps hands clear of blade. Optional saw guard for added safety. As 9" circular saw, SHOPSMITH offers full 48" blade-to-fence capacity.



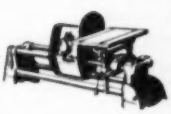
SHOPSMITH as a 16½" drill press

New depth control dial gauges quill feed. 14" x 18⅜" tilting table. Miter gauge and rip fence serve as handy jigs. As a horizontal drill, SHOPSMITH gives unlimited capacity, complete flexibility.



SHOPSMITH as a 34" lathe

Universal tool rest slides parallel to work, quickly adjusts in height with rack-and-pinion control. Eccentric cup center mount offsets up to ½" for accurate taper turning. Speed-Dial gives unlimited speed selection.



SHOPSMITH as a 12" disc sander

Quill feed allows sanding disc to be fed into work for greater accuracy, safety. Easily set up for precise duplicate sanding. Extra disc can be attached to auxiliary spindle for rough and finish sanding.

SHOP SMITH

MAGNA ENGINEERING CORPORATION
Dept. 276-U, at factory nearest you
12819 Coit Rd., Cleveland 8, Ohio, OR Menlo Park, California

Please send me 20-page catalog on the New SHOPSMITH and information on school application of SHOPSMITH.

Name _____ Position _____

Address _____

City _____ State _____

Your Students Will Learn FASTER on a PARKS PLANER

The PARKS No. 20
20" PLANER

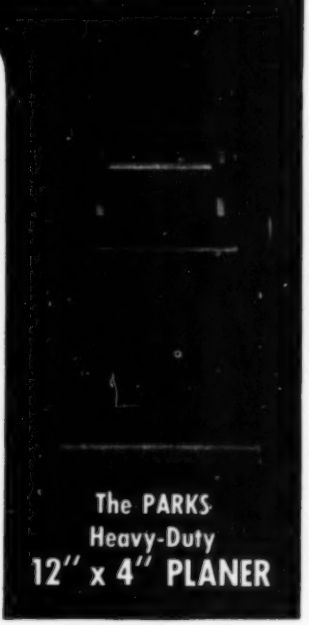
Students advance quickly on Parks Planers because they find them easy to operate, safe, and accurate. And, since both the Parks 12" and Parks 20" Planers have been designed and precision-built for accuracy and high-speed line production in industry, they are ideally suited for the school shop because they give practical experience on the type of machines your students will eventually use. Both machines are priced low enough for even the most modest shop budget.

The Parks No. 20. 20" Planer has a 4-knife cutterhead with a speed of 3600 R. P. M. and offers two feed speeds—20 and 40 F. P. M., and 40 and 80 F. P. M. Will take work up to 20" wide by 6" thick. Ruggedly built for vibrationless operation.

The Parks Heavy-Duty 12" x 4" Planer. A compact, sturdy thickness planer that offers mill planer precision at low price. Has feed speed of 16 F. P. M. at 4000 R. P. M. Will handle material as short as 6" and as thin as 1/16".

Write for complete descriptive literature.

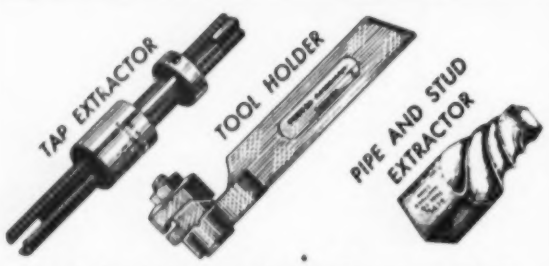
Manufacturers of Quality Woodworking Machines since 1887.



The PARKS
Heavy-Duty
12" x 4" PLANER

The PARKS WOODWORKING MACHINE CO., Dept. 24-C11, 1546 Knowlton St., Cincinnati 23, Ohio

WALTON *SPECIALIZED* TOOLS



Used in Many School Shops to Train Metal Working Students in *Time Saving and Parts Salvage*

WALTON TAP, PIPE & STUD EXTRACTORS

Used extensively in metal working shops throughout industry to remove broken taps, pipes, and studs. Quick, easy, inexpensive. They save time, and salvage parts otherwise scrapped.

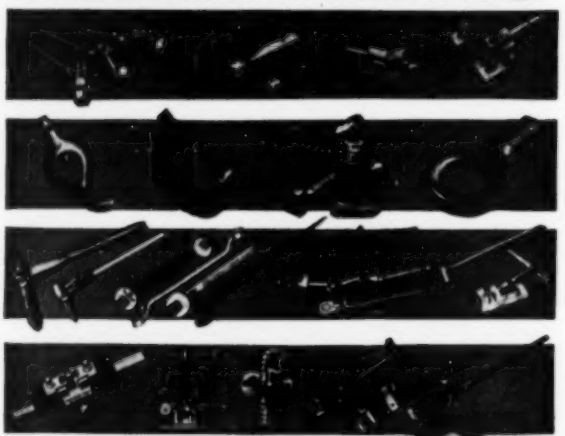
WALTON-AMERICAN TOOL HOLDERS

A universal holder, adjustable to straight, right or left hand offset positions. This holder saves time by allowing changes to be made at the machine without removing holder.

Write for descriptive literature of all three tools, contained in our catalog No. 32. Also Free Trial Offer.

THE WALTON CO., Hartford 10, Conn.

ARMSTRONG



Teach with the standard tools of industry.

Write for Catalog

ARMSTRONG BROS. TOOL CO.

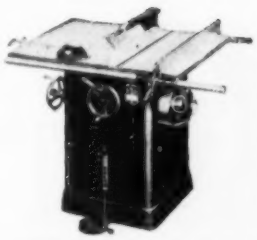
"The Tool Holder People"

5222 W. Armstrong Ave. Chicago 30, U. S. A.
New York, San Francisco

Here's Why 67% of U.S. School Shops Are Equipped With Rockwell-built

DELTA POWER TOOLS

DELTA 12" Lathe

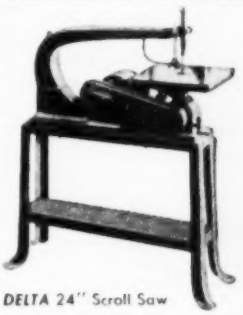


DELTA 10" Unisaw (also available in 12" model)

DELTA 14" Band Saw (also available in 20" model)

DELTA 17" Drill Press (also available in 14" model)

DELTA 6" Jointer (also available in 8" model)

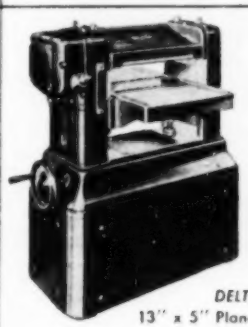


DELTA 24" Scroll Saw

DELTA 7" Standard Motor Grinder

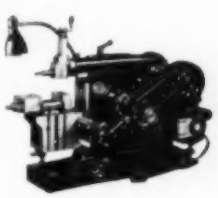
DELTA 6" Abrasive Belt Finishing Machine

DELTA Wood Shaper



DELTA 13" x 5" Planer

DELTA 12" Abrasive Disk Finishing Machine



DELTA 7" Metal Shaper

☆ **SIMPLE** to learn on

☆ **SAFE** to use

☆ **EASY** to move where you want them

☆ **ACCURATE** and ruggedly built to stay accurate

☆ **GREATER VERSATILITY** for increased usefulness

☆ **INEXPENSIVE** to buy, to operate, and to maintain

The outstanding advantages that make DELTA Power Tools the choice for 67% of U. S. school shops are also creating an entirely new production concept in industry. The same DELTA Tools used so widely for industrial arts and vocational instruction are supplementing—and in many instances replacing—costly immovable machines in industrial plants everywhere. More and more of your students will use DELTA Power Tools on their jobs after graduation—an important reason for training them on DELTA Tools now. Call your DELTA Dealer; he's listed in your classified phone book under "TOOLS" or "MACHINERY." And write for AB-53 catalog. *Delta Power Tool Div., Rockwell Manufacturing Co., 402L North Lexington Ave., Pittsburgh 8, Pa.*

DELTA QUALITY POWER TOOLS

ANOTHER PRODUCT BY—

Rockwell

Increased production facilities allow immediate delivery on school orders . . . NO WAITING!

4 New Project Books... for Modern School Shops

1. CONTEMPORARY FURNITURE

By A. F. Bick

Fifty-eight relatively easy-to-make woodworking projects embodying contemporary design that will help the student understand and reproduce this modern look in furniture. Bills of material, tool and working instructions, and complete drawings are included for terrace and reading chairs, open and closed cabinets, desks and tables of many kinds.

$2.75

2. CRAFTWORK IN METAL, WOOD, LEATHER, PLASTICS

By Franklin H. Gottshall

By performing the fundamental operations involved in these 39 stimulating projects, the student will become thoroughly familiar with most of the basic processes a skilled craftsmen uses when working with metal, wood, leather, plastics, or combinations of these. Includes clever articles using two or more materials.

$4.00

3. FURNITURE ANTIQUES MADE IN VIRGINIA

By E. Carlyle Lynch, Jr.

An original sourcebook of graceful furniture pieces from colonial Virginia. Authentically measured and sketched, these projects include tables, chairs, chests, beds, highboys, and even a Grandfather's clock in such styles as Chippendale, Queen Anne, Hepplewhite, Windsor, American and English Empire, and others.

$3.50

4. 101 ALPHABETS

By W. Ben. Hunt and Ed. C. Hunt

Two commercial artists and lettering experts have written this new book that provides more than 100 complete styles of lettering, ranging from architectural outline and basic Roman lettering to the latest in modern styles. 101 styles, each a complete alphabet.

$3.75

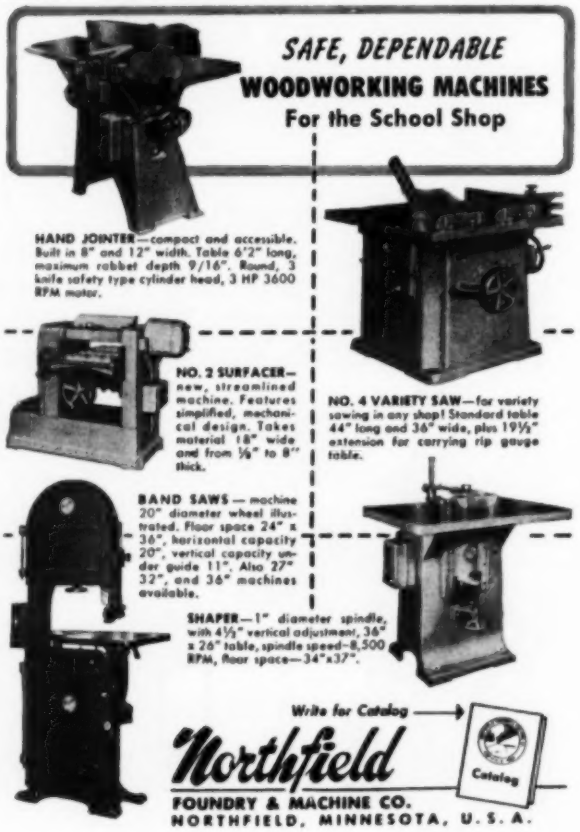
AVAILABLE FOR A 30-DAY STUDY PERIOD!

THE BRUCE PUBLISHING COMPANY
711A BRUCE BUILDING MILWAUKEE 1, WISCONSIN

Put this sturdy "OLIVER" Jig Saw to work in your shop

Students soon learn to cut intricate jig, scroll and fret work with ease on this "Oliver" Jig Saw. There is 36½ inches between saw and column, and the table is turned one-eighth way 'round to take stock of any length and practically any width. Unique saw tension device promotes finer work. Table tilts 30° to right and left of saw. Fully safeguarded. *Write for Bulletin No. 173.*

OLIVER MACHINERY COMPANY
Established 1890 GRAND RAPIDS 2, MICHIGAN


SAFE, DEPENDABLE
WOODWORKING MACHINES
For the School Shop
HAND JOINTER—compact and accessible. Built in 8" and 12" width. Table 6'2" long, maximum rabbet depth 9/16". Round, 3 knife safety type cylinder head, 3 HP 3600 RPM motor.
NO. 2 SURFACER—new, streamlined machine. Features simplified, mechanical design. Takes material 18" wide and from ⅛" to 8" thick.
NO. 4 VARIETY SAW—for variety sawing in any shop! Standard table 44" long and 36" wide, plus 19½" extension for carrying rip gauge table.
BAND SAWS—machine 20" diameter wheel illustrated. Floor space 24" x 36", horizontal capacity 20", vertical capacity under guide 11". Also 27" 32", and 36" machines available.
SHAPER—1" diameter spindle, with 4½" vertical adjustment, 36" x 26" table, spindle speed—8,500 RPM, floor space—34"x37".
Write for Catalog
Northfield
Catalog
FOUNDRY & MACHINE CO.
NORTHFIELD, MINNESOTA, U. S. A.

STANLEY SHOP TALK

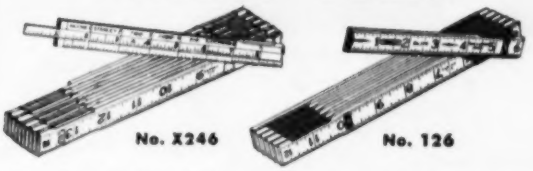
"PULL-PUSH" RULES

No. 6386W

The Stanley No. 6386W. For direct reading of inside measurements—no adding. White ½" blade with big, black numbers and entire length of both edges graduated in 16ths—top edge in 32nds for 6 inches. "Tru-Zero" hook for always exact measurements, inside and out—6 ft.

The Stanley No. 346W. "D" shape. Add 2" for inside measurements. Same easy to read numbers and graduations on replaceable blade. No. 346W—6 ft. No. 348W—8 ft. No. 3410W—10 ft.

"ZIG-ZAG" RULES



No. X246 No. 126

The Stanley No. 126. A new folding rule with square "Green Ends". Opens so students can gauge and scribe lines for even inches 2", 4", 6", 8", 10", 12", etc. Tough, hardwood sticks with wear-resistant plastic coating, big black numbers and ball-lock joints.

The Stanley No. X246. A 6 ft. extension rule with many extra features. Every joint opens on an even number. 8" brass extension slide in extra heavy first stick—ideal for inside measuring.

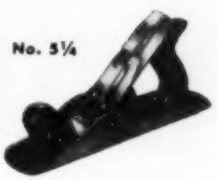
BLOCK PLANE

No. 118

The Stanley "100 PLUS" No. 118. Here's an all steel plane that's really BOYPROOF. Only three pieces, and the locked-in cutter adjustment prevents thread stripping or lost parts.

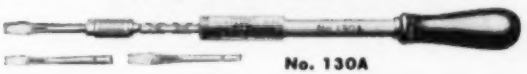
JACK PLANE

No. 5¼



Stanley No. 5¼ Junior Jack. The ideal plane for boys at the junior high school level. Fast, clean cutting, easy to adjust, it's 11½ inches of balanced performance.

"YANKEE" SPIRAL RATCHET DRIVER



No. 130A

The "Yankee" No. 130A with quick-return spring in handle. Saves time and muscle. Supplied with three sizes of bits. "Yankee" Spirals available in three sizes, two styles. To convert this versatile tool for other jobs, buy accessories listed here.

BITS, DRILL POINTS, COUNTERSINK. Accessories available for "Yankee" No. 130A: Nos. 301, 302 and 303—Phillips bits in three sizes. No. 309—Adapter and 8 drill points. No. 3030—Countersink.

ELECTRIC DRILLS

No. 24A

The Stanley No. 24A. A regular duty ¼" drill ideal in size and weight for instruction use. Power packed yet light in weight. 1100 r.p.m. full load speed.

The Stanley No. 112. For heavier work; this general purpose drill cuts ½" in steel and 1⅜" in wood. Bench stands are available for this, and all STANLEY ELECTRIC DRILLS.

No. 112

A full line of STANLEY ELECTRIC DRILLS *in all sizes and capacities.*

STANLEY Tools®

A Division of The Stanley Works

HARDWARE • ELECTRIC TOOLS • STEEL STRAPPING • STEEL

USE THIS COUPON FOR MORE DETAILED INFORMATION AND SCHOOL SHOP HELP.

STANLEY TOOLS, Educational Dept. B, New Britain, Connecticut

FREE ( ) Please send me Stanley Tool Catalog No. 34.
FREE ( ) Please send me the Stanley Electric Tool Catalog.
FREE ( ) Please send me "Yankee Screwdriver Chart No. Y43.

Please send the Stanley Tool Guide. The Tool Guide contains 38 charts, perforated and punched for 8½"x 11" notebooks. They cover all the common woodworking tools and many metalworking tools . . . hundreds of illustrations.

25c each
15c in lots of ( ) or more

NAME .....

SUBJECT YOU TEACH or POSITION .....

SCHOOL ADDRESS .....

CITY ..... ZONE ..... STATE .....

there's a **BIG** difference in the STRENGTH of **"C" Clamps**

insist on genuine

"Jorgensen"

"engineered" "C" CLAMPS

Strong expertly designed "JORGENSEN" Style No. 120 (above). Best value in "C" Clamps . . . ask your dealer. Style No. 1 "JORGENSEN" Carriage Clamp (right) give long service under hardest usage. Low in price.

insist on genuine "Pony" SMALL "C" CLAMPS

Will out-work, out-last ordinary "C" Clamps many times. Low priced. Many sizes and styles.

"Jorgensen"

BAR CLAMPS

fast-operating, many sizes

free catalog of Handscrews, Clamp Fixtures, Press Screws.

ADJUSTABLE CLAMP CO.

424 No. Ashland Ave. • Chicago 22, Illinois

A NEW, LOW-COST JIG SAW

Perfect for School Shop Projects!

DREMEL MOTO-JIG SAW OUT-PERFORMS OTHERS COSTING MUCH MORE

On'y $23.50

Complete with ROTARY MOTOR

POWERFUL . . .

Built-in ROTARY MOTOR (not a vibrator) cuts 1½" wood, ¾" plywood, metals, plastics, etc.

GREATER VERSATILITY . . .

4-Way-Blade Holder saws in any direction — handles any length stock. Table tilts 45°, also raises and lowers.

SAFE . . .

Foolproof blade guard makes it safe to operate, ideal for student instruction.

SIMPLE TO OPERATE . . .

Just plug it in . . . flip toggle switch. Blades easily changed in a jiffy. Has no blade tension spring to adjust.

ECONOMICAL . . .

Inexpensive to buy, to operate and maintain. Priced for tight school budgets.

ROCKER ACTION . . .

This exclusive Dremel principle obsoletes the old style blade tension spring. Cuts faster — eliminates blade breakage.

Get the complete story! Write for free catalog!

DREMEL MFG CO. Dept. 314-L Racine, Wisconsin

KALAMAZOO

MODEL 8C
CUTS 8" ROUND,
16" FLAT STOCK,
8" PIPE

METAL CUTTING BAND SAW

Good tools make teaching good workmanship easier. That's why most leading schools use *Kalamazoo* Metal Cutting Band Saws. Specify *Kalamazoo* for accuracy and safety. Four models, available with casters and coolant. Get full details *now*.

MACHINE TOOL DIVISION

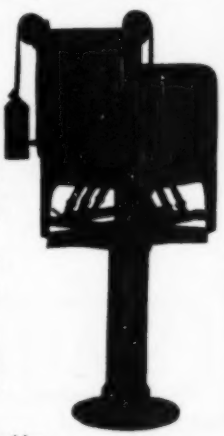
Kalamazoo TANK and SILO CO.

1119 HARRISON ST., KALAMAZOO, MICHIGAN

EASY FAST

Now **ONE** Furnace for teaching a variety of heat treating techniques

THE JOHNSON No. 706



Teach a wider range of hardening, tempering and annealing with the Johnson No. 706. Six powerful direct jet burners deliver easily controlled temperatures from 300° to 1850° F. Uses natural, artificial, mixed, or bottled gas. Economical in operation. Firebox 7 x 13 x 16½ inches.

No. 706 Pedestal (illustrated) . . . $278.00
No. 706 Bench . . . $250.00
No. 654-Four Burner with 5 x 7¼ x 13½ inch firebox.
Pedestal . . . $150.00
Bench . . . $124.00

All prices F.O.B. Factory

Renew the efficiency of your older Johnson Furnaces

Write for details on low cost factory rebuilding.

FREE CATALOG

JOHNSON GAS APPLIANCE CO.

585 E AVENUE N.W. CEDAR RAPIDS, IOWA

This huge machine shop of the Dravo Corporation is typical of the way hundreds of industries have put color to work according to the principles of COLOR DYNAMICS.

Pittsburgh COLOR DYNAMICS

Contributes to plant efficiency and productivity

Skilled shopmen of tomorrow must know how to use this modern painting system to improve production and morale of workers.

BESIDES KNOWING about metals, machines and methods, the skilled shopman of tomorrow must be familiar with the ways color can be put to work to improve productive efficiency and employee morale.

That's why many educators in vocational science now include Pittsburgh COLOR DYNAMICS in their training courses.

COLOR DYNAMICS is a painting system based upon the simple principles of the energy which color possesses. We know some colors stimulate and excite, others soothe and relax, still others fatigue and depress.

By the proper application of COLOR DYNAMICS on machines, the operator's attention can be focused better on his task. By using focal colors, stationary parts are easily distinguished from working parts and production materials. Eye travel is reduced, lessening eye fatigue.

Morale-building colors on walls and ceilings promote cheerfulness and lessen mental depression. Use of safety colors reduces time-loss accidents.

If you desire your students to be better equipped for their future work in industry, begin now to teach them COLOR DYNAMICS.

FREE—Color Engineering Study of Your Classrooms

- Write today for a free copy of our booklet explaining how COLOR DYNAMICS can be put to work in a plant. Better still, we'll be glad to demonstrate the benefits of COLOR DYNAMICS in your classroom.
- We'll provide a free color engineering study for you without cost or obligation. Call the Pittsburgh Plate Glass Company branch nearest you and arrange to have a color expert see you at your convenience. Or send this coupon.

Send For Free Book

Pittsburgh Plate Glass Co., Paint Div.
Department IA-114, Pittsburgh 22, Pa.

☐ Please send me a FREE copy of your booklet, "Color Dynamics."

☐ Please have representative call for Color Dynamics Survey without obligation on our part.

Name _____

Street _____

City _____

County _____ State _____

PITTSBURGH PAINTS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS • FIBER GLASS

PITTSBURGH PLATE GLASS COMPANY

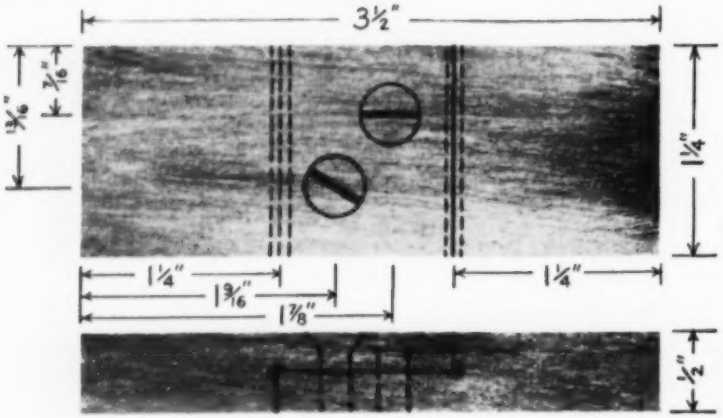
IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

HOW-TO project for the School Shop

—by NICHOLSON FILE COMPANY

NO. 3 OF A SERIES

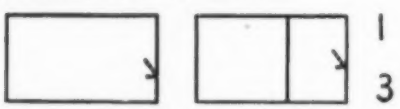
MAKING A STEP JOINT



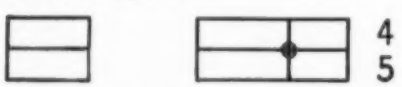
Good teaching makes good mechanics. Adding persistent practice—especially on precision work — makes them EXPERT mechanics. Described here is another good basic-type hand operation requiring exactness attainable only with the use of The right file for the job.

Material: Two pieces Cold Rolled Steel, each 2 1/4" x 1 1/4" x 1/2". **Tools:** Copper vise jaws; 6" rule; scratch-awl; surface gauge; square; 3" dividers; center punch; 1/16" drill; hacksaw; 10" Hand Bastard and/or 10" Pillar Bastard file; 12" Mill Smooth file.

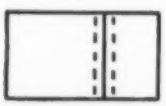
SCHEDULE OF OPERATIONS



1. Square one end on each piece, using Hand Bastard or Pillar Bastard file and square. **2.** Clean and paint surface with layout dope. **3.** Set surface gauge to 1" and scribe line measured from squared end and sides of both pieces.

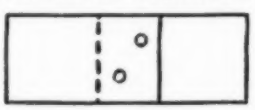


4. Set surface gauge to 1/4" and scribe line on sides and end of both pieces. **5.** Make center-punch mark 1" up on 1/4" lines on both pieces.



6. Drill 1/16" hole through each piece. Be sure to have work clamped straight in vise to ensure drill holes being parallel with the 1" scribed line.

7. Place work in vise and saw out sections. Care should be taken not to cut out drilled hole. **8.** File to lines, taking care this surface will fit flat and true. Use 10" Pillar Bastard file for narrow shoulder surface; 10" Hand Bastard or 10" Pillar Bastard file for wide surfaces and exposed ends.



9. Lay out drilling and tapping holes. **10.** Drill and tap for 10 x 32 flat head screw, taking care both pieces are held together firmly. Use Tap Drill No. 20; Body Drill No. 7; countersink 82°. **11.** File square all over with 10" Hand Bastard or 10" Pillar Bastard file. Use chalk on file. It will help to avoid pitting or scratching work. **12.** Drawfile or straightfile with diagonal strokes, using chalked 12" Mill Smooth file.

These reproductions are approximately half the lengths of the files designated for this project. →

FREE REPRINTS OF THIS PAGE

for school-shop use will be sent to school heads or instructors on individual request. Ask for "How-to Project No. 3" and give minimum number of copies you need. The files recommended in the foregoing text (made in both Nicholson and Black Diamond brands) are widely obtainable from industrial supply houses and hardware dealers.

NICHOLSON FILE COMPANY
U. S. A.
47 Acorn St., Providence 1, Rhode Island
World's foremost manufacturer of A FILE FOR EVERY PURPOSE
(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

Industrial Arts and Vocational Education
The Shop Teachers Professional Magazine
NOVEMBER 1954

One Method of Preparing for

The Crisis in Vocational Education

WILLIAM T. BAWDEN
Emeritus Professor of Industrial Education
Kansas State Teachers College
Pittsburg, Kans.

The friends of vocational education are understandably concerned about the mounting criticisms of the policy of federal subsidies. To begin with, the concept of federal subsidies is not a new one. In the early days of the settlement of the middle west and the far west, the Federal Government contributed millions of dollars to aid in the building of railroads. Later, many millions of dollars went into the building of dams, electric power plants, and irrigation projects.

Specific subsidies to education in the several states include the Morrill Act of 1862, for the establishment and maintenance of the Land Grant Colleges, and subsequent related legislation. Still later came the Smith-Hughes Vocational Education Act of 1917, and supplemental acts, providing subsidies for the promotion of vocational education.

Renewed and Widespread Criticism

It should be noted that opposition to these subsidies is not new. No one of these appropriation laws was enacted except over determined opposition. Opposition and criticism have continued down through the years. However, in recent years, objections have taken new forms, and have been pressed with new vigor.

News reports coming out of Washington indicate that not only the Smith-Hughes vocational education program but other methods or forms of federal grants to the states are under heavy fire. The new Hoover Commission has been expressly directed to study the question as to whether or not some or all of these systems of federal subsidies should be tapered off and gradually eliminated. It is to be noted that certain influential members of both Senate and House have declared openly that in their opinion the answer to this question is *Yes!*

It is easy to understand that mounting government expenses, and our astronomical public debt, with no relief in sight, are arousing something more intense than mere worry or anxiety. The more thoughtful and conscientious among our representatives in the Congress must be appalled at the magnitude of the threat to our future solvency as a nation. The very size and complexity of our annual budget take it beyond the range of comprehension, even of the experts in finance whose responsibility it is to deal with it.

We are becoming aware of the fact that we are reaping the consequences of our system of government by pressure groups. Our trouble is that pressure groups are acquisitive and aggressive — each one emphasizes a need, and demands an appropriation to meet it. We have not encouraged the development of pressure groups committed to sanity and economy in government finance. And while it is true that the appropriations for vocational education are "but a drop in the bucket" when compared with the billions of dollars of total expenditures, the fact still remains that our responsible leaders are bound to consider every possibility for economy without the sacrifice of essential services.

Results of Promotion

In taking stock of the situation confronting us today, it would seem imperative that the supporters of a national program of vocational education should examine some of the questions that are calling for solution. Undoubtedly the answers to these questions will be sought in the process of arriving at final decisions with reference to the future of federal subsidies. We may as well face them now, among ourselves, for they are almost certain to be thrown at us.

The first of these questions is the obvious one as to how much "promoting" is necessary to get a program established. I well remember the debates on the Smith-Hughes Bill, as I sat in the visitors' galleries in both the Senate and the House, back in 1916 and 1917. It was set forth that everybody accepted the necessity for a nationwide program of vocational education, but that it was evident that it could not be started without federal aid. The several states needed not only expert guidance in planning procedures, but financial assistance in providing the appropriate facilities. To these representations the opponents of the legislation countered by predicting that the result would be to saddle the Federal

Government with a financial burden that would never be lifted.

We have had well over 30 years of vigorous promotion of a nationwide program of vocational education, under the stimulus of federal subsidies, which have actually been substantially augmented during the period. No one can reasonably object to the practical question: Has any appreciable progress been made in the direction of giving the program a momentum of its own, which will carry it forward in the absence of federal aid? Looking back over the record it is difficult to provide an answer that would seem satisfactory to the opponents of the movement. Indeed, it would be difficult to assemble any great amount of evidence that serious thought had ever been given to such a question.

Relation to the Public Schools

The second question calling for study has to do with the relation between the subsidized program of vocational education and the public school system. Herein is to be found one of the fundamental weaknesses in the Smith-Hughes setup, and not enough has been done to try to remedy it.

The difficulty began, back in 1917, with the original adoption of the policy of separating the vocational education program completely from the public school system. For this step Dr. Prosser was principally responsible, although he had the support of many prominent leaders of that period. The argument was based on the earlier experience with "manual training" in the public schools. "We learned our lesson once, and we are not going to permit the traditionally minded superintendents and principals to do to vocational education what they did to the manual training movement. We intend to stay away from (the public schools), keep our vocational education separate and independent, and thus avoid any ground for suspicion that vocational education will ever be dominated by general education."[1]

The untoward consequences of this attitude have been manifest at various intervals during the intervening years, but they promise to become even more annoying than ever before. The vulnerability is inherent in the separation. The vocational education program can now be attacked openly and separately by its opponents, without appearing to object to expenditures for the regular public schools. If vocational education had been developed through the years as an integral part and an indispensable function of the public schools, as it should have been, it would now be intrenched behind the popular belief in and support of public education. If it seems difficult today to marshal the support of certain influential educators, whose attitude is lukewarm if not indifferent, the explanation is to be found in numerous unhappy experiences with this policy of separation.

It is, of course, rather late now to work on this problem in the attempt to meet the present crisis. Changes in deep-seated relationships are not easily brought about.

Qualifications of Teachers

Another fundamental weakness in the vocational education movement is in the kinds and caliber of persons it has always been willing to "approve" as teachers, and in some instances as supervisors and directors. The Smith-Hughes administration has never hesitated to pull a man out of the factory or shop, have him attend a few "conferences," pin a tag of "teacher" on him, and install him in a place of responsibility. It must be freely admitted that no one is likely to succeed as a teacher of the technical details of a skilled trade who has not had a reasonable amount of experience as a practitioner of that trade. Why not also freely admit that no one is likely to succeed as a teacher of any line of work who has not had a reasonable amount of preparation for, and some adequate comprehension of, the responsibilities of the *teacher?*

There are two respects in which to consider the vulnerability of the vocational education movement in this matter of the qualifications demanded of teachers.

The first is by comparison with the qualifications demanded of teachers of industrial-arts subjects, with whom trade teachers have many things in common. The contrast was neither so obvious nor so striking back in 1917, when the Smith-Hughes law was enacted. Disregarding the unknown number of teachers who came in with no special professional preparation, many industrial-arts teachers of that period had no more than two years of normal school, and many others could boast of no more than one or two six-week summer sessions. In other words, the industrial-arts teachers we knew back in 1917 could scarcely find employment today.

In the selection of the trade teacher, in the early days of the vocational education movement, the emphasis was on the possession of "from three to five years of practical experience in the trade." If the applicant was a high school graduate, so much the better.

Stepped-Up Standards

In common with other departments in our high schools, industrial arts has profited immensely by the stimuli afforded by the accrediting agencies, and by other forces contributing to the notable raising of standards in public education that has been achieved during the past 25 to 30 years. The demands for additional professional preparation of teachers of all types in the regular public schools — not excepting teachers of industrial arts — have been continually stepped up. Many years ago the possession of the bachelor's degree, with emphasis on the special subject or subjects to be taught, became the standard requirement in the secondary school, and even in many elementary schools. Today, the master's degree is prerequisite to employment in the better high schools.

Further, teachers do not move up in the salary schedule unless they are continually adding to their professional attainments, by summer session study, by travel, and in other ways. A substantially increasing proportion of industrial-arts teachers are able to hold their own in their associations with their colleagues in matters of scholarship, catholicity of interests, and general intellectual attainments.

Improvement Has Been Slow

The second respect in which the vocational education movement appears at a disadvantage in this matter of the qualifications demanded of teachers is found in a comparison between conditions in vocational education in 1917 and those at the present time.

It is easy to understand that the difficulties confronting the early administrators in their search for qualified trade teachers were quite insurmountable. Just as in the beginning of the "manual training" movement, there was no source of supply of trained teachers of any description. School authorities were compelled to take what they could get. Granted that trade experience was essential, there was no alternative to recruiting teachers from qualified mechanics. The provision that candidates should have as much professional preparation as possible was, at that period, little more than a pious hope.

The real basis of criticism is that during the ensuing 30 years and more so little has been accomplished in the way of raising the standards of qualifications of industrial teachers. It is, of course, futile to attempt to induce prospective teachers of the skilled crafts to go to college or university for four years of professional preparation. For one thing,

[1] See, Biography of Charles Allen Prosser, INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine, beginning in September, 1952, p. 218.

there is no prospect that such teachers would receive increased compensation to justify the expense and effort. The application of only a very small amount of pressure in the direction of higher standards of qualifications for shop teachers would be sufficient to drive the men back into their trades, or to make it impossible to induce them to leave their trades in the first place.

Changes in Conditions

One of the unanswerable arguments for federal subsidies rests on the facts of gross inequalities in ability to support education in the several states. The final question to be considered here relates to the possibility that the data used in the arguments may no longer be valid; or, at least, that they may no longer be as conclusive as when they were first cited. During the past decade there has been a substantial amount of decentralization of industry — a dispersal of many types of manufacturing.

It is possible, of course, that unfavorable conditions and inequalities are just as acute as they were in 1917. It seems quite possible that such inequalities or inabilities as now exist are in regions different from the distribution upon which the original arguments were based. It would be unfortunate if some statistician were to come forward with the report of a study which shows that certain conditions which are vital to the force of the argument are really nonexistent.

Food for Thought

A concerted effort is being made to prevent the curtailment of federal appropriations for the support of vocational education. There are ample reasons to justify the making of such an appeal. I have no recommendations to submit along that line, but I do think it important to give some attention to the questions raised herein. Recognition of the significance of these and other considerations, even though it may now be too late to do much about them, may at least prepare us in a measure, if it is our lot to experience some disillusionment with the unfolding of events.

A Needed Method of Preparing for

The Crisis in All Education

WILLIAM F. RASCHE

Director, Milwaukee Vocational and Adult Schools
Milwaukee, Wis.

Educators in the vocational and adult fields have continuing problems to face and solve. Facing and solving problems, however, are not experiences peculiar to vocational and adult education. The general educator is in exactly the same position and, if we leave the field of education, we find the same is true for workers in all other areas of human activity — in the other professions, in government, in agriculture, in industry, in business, and in the American home. The fact that problems beset everybody everywhere, and call for solutions, points to one great need in education. That need is to teach our American youth how to face the problems of life with intelligence, poise, confidence, and skill, and solve them successfully. This obligation rests upon educators in all fields, both academic and practical, as well as parents, and should be discharged, not only through direct instruction, but, also, by example on the part of all who guide and instruct youth.

The Economic Factor

Vocational education has received federal subsidies since 1917, just as land grant colleges have received subsidies since 1862. Local school systems concerned primarily with general education also receive aids, in some instances in very generous amounts, from their state governments. Gifts are also given to private and public schools by wealthy individuals and foundations or by alumni whose organizations solicit annual contributions for their schools. Few public institutions operate only on taxes received locally. In considering the whole problem of educational aids and subsidies, we come to grips with a complex problem of financial support which is in nowise limited to vocational education. It faces administrators at every level.

Since we live in a time when changes are occurring very rapidly due to technological progress, we may assume that programs of financial support for education need to be restudied periodically, even though they were correctly planned when first established. Restudy and resetting of such support programs must be on sound principles and must conform to the needs changing patterns in our life and economy are casting up. Too often, we are prone to be indifferent to changing conditions until developing defects show up which invite the driving fire of the critics.

The federal subsidies for vocational education have accomplished great good and will continue to do so. Nevertheless, they also have invited sharp criticisms. For example, the impact of the current economy drives, to cut down the national budget to bring it into better balance, reduced these subsidies for a period of two years. An approximate drop of a million dollars a year was put into effect by Congress in response to this pressure. Cutting budgets, however, should be done by the exercise of proper discrimination. Some subsidies are productive and some are not. If the expenditure of federal funds for vocational education results in productive gains and increases the national wealth, then the subsidies are justified. The Congress, in the session just closed, must have concluded that such was the case, because the federal subsidies for vocational education, in the budget recently approved, were increased by approximately five million dollars. Notwithstanding this restoration and increase in the vocational subsidies, vocational educators need to reappraise

their local programs carefully to insure productive use of the funds they receive. Thus may they hope to avoid future attacks on these subsidies.

Must Promotion Continue

If we look at American business and industry and study the nationally known organizations that are admittedly successful, we will note that, out of their own profits, they allocate regularly a certain percentage for the promotion of more business. Advertising is one such form. Industry and business are also promoted in other ways. Use is made of research departments which improve design and the quality of product or create new and superior products. Any business that does not do this in the long run will lose out against competitors who keep pace with changing conditions.

American education no more than business and industry can remain static in any area, general or vocational. The American public must be educated to see this and to recognize its obligation to provide better facilities, better teachers, better teaching aids, and essential auxiliary services to make available a truly complete educational program for every child, youth, and adult in need of continuing education.

The progress of business and industry is greatly accelerated as people who are employed, and all people who use the products or services offered by business and industry, become both better educated culturally and better trained vocationally for the occupations in which they labor. Our society as a whole and the individuals who compose it benefit by the promotion of education. In short, education pays; and improved education pays better than education which is meagerly and insufficiently supported.

But whether we support education generously or grudgingly, we pay the bill for an adequate program in one form or another, nevertheless. One of the tremendous costs assessed to us today is represented by the social deficit that exists wherever society "shortchanges" its members educationally. The financial costs for welfare, delinquency, and crime represent "lost subsidies" that should have been spent on constructive social investments which would have prevented these deficits. Education — both general and practical — is one area where greater aids and subsidies are needed to prevent such deficits. Also, it must be remembered, practically all financial support, federal, state, and local, comes from the "people back home," even though it is distributed through governments on several levels. The bulk, however, must be provided locally, except in those areas where economic resources are insufficient. There financial aids should be proportionately greater than in the wealthier areas. Vocational subsidies can be and, in some states, are administered in this way wherever administrative genius applies aid, both according to need as well as to basic general over-all patterns.

Does Educational Consolidation of All Educational Areas Assure Uniform Treatment of All Areas?

The writer believes in protective funds for vocational education. The struggle for the educational dollar is in progress in every American community where "war babies," now children ready for school, are crying for more schoolhouses and more teachers. If all educational monies for a community are placed in one budget, the "pressure area" within the system will get so much of the general budget that some activities (vocational education is one of them) will be starved in the effort to meet the primary needs of the system. The tendency is invariably to attend to the needs of children first and adults last. Yet, as has been pointed out, the competence of our adult members of society is enhanced by vocational education; and the productivity of our economy is increased as workers become more capable and skilled. Protection of adequate funds for vocational education thus insures larger resources for the education of the young. Where states and communities fail to recognize this principle, the vocational education services are often restricted and inadequate. One may find in America vocational and technical schools that are static because they have been budget-bound by general school budgets which freeze their vitality. Since the vocational portion of the educational dollar increases earning power directly, vocational funds should be protected so that they cannot be spent for other purposes. Under a priority system lacking such safeguards, funds too often dry up before they reach the vocational education program.

Teacher Qualifications

Much has been said about teacher qualifications for vocational education. It is true that when the movement started in 1911 in Wisconsin and in 1917 generally throughout the nation, vocational teachers were not available in the numbers needed. Available were competent and skilled workmen who had the practical skills, knowledges, and judgments required for vocational success in their respective trades or other occupations. Vocational schools had to draw upon this pool for its pioneer teachers.

Society's first teachers in all walks of life were not trained in teacher training institutions. Education, both cultural and practical, was first a family matter. Father taught son and mother taught daughter. Only as the race progressed and learned to specialize, did the need for special instructors arise. The transfer of the teaching responsibility from the family to the school has been effected by slow evolution through many centuries. We can, therefore, be somewhat patient, if the vocational administrator cannot always get a ready-made tradesman or other specialist who is equally competent as a good instructor. The race has taken more centuries to develop the highly efficient general teachers than years have passed since subsidized vocational education was given life in the second decade of this century.

Short as the time has been, the best vocational schools have made remarkable progress in upgrading vocational teachers. They have established in-service training departments and they have established salary schedules that are dependent upon self-improvement through participation in summer schools, Saturday classes, or university extension courses available in late afternoon or evening classes.

There is just cause, however, for criticism of those schools which have neglected the responsibility to upgrade teachers. Such schools should be, and in some states are, penalized by withholding aids for teachers whom they fail to improve in service.

One consoling factor in the present situation is that vocational schools of the better kind are attracting skilled men and women who find other satisfactions in teaching which they did not find to the same degree in their trades or specializations. Also, the general level of academic achievement has been raised as the high school has attracted increasingly larger numbers of graduates from the elementary schools. America's skilled workers are generally much better schooled than were skilled workers thirty years ago. All this has strengthened the newer teachers coming into service now.

It is frequently possible to secure, not only skilled workers who have had one or two years beyond high school, but also some who have been graduated from four-year college or university courses. Occasionally, for some rare types of work, it is true, the pinch is still there; and less than satisfactory appointments must be made. However, all in all, the general situation has greatly improved. This is especially true in communities where industries test applicants for apprenticeship and accept only those for training whose mental equipment is equal to or better than the average of the journey-

men already in the occupation. This upgrading for industry also upgrades men who will later transfer from industry to vocational instructorships. It should also be observed that vocational schools, which have won the respect of the industries they serve, are given ready assistance in finding potentially competent men.

Problems of teacher selection, however, are not limited to vocational education. We need not apologize for the occasional teacher who will need extensive training before he can expect to be a truly competent instructor, provided we continue his training while he is in service. All over America, all education is facing a teacher crisis. With all the safeguards our states have set up in terms of required teacher qualifications, substandard academic teachers are still with us. They are with us, not because we like to have them, but because we have not enough of the other kind to meet the demand for fully qualified teachers. "War babies" were born in greater numbers than teachers in sufficient supply were prepared to teach them.

All this brings us back to the adequacy of the financial support required to meet these growing needs in all areas of education. Additional financial support must come from increased wealth. Wealth is created by ingenious minds and competent hands. Such minds and hands are educated and trained in the schools. And skills and technical knowledges are primarily developed through vocational and technical schools in conjunction with active operations in agriculture, business, industry, the service fields, and other occupations. Financial protection for these special schools will insure funds, not only for their own support, but also for all other types of schools, besides rewarding the trainees and society for the investment both have made in vocational education.

Making the General Shop Effective

AMOS D. COLEMAN

State Supervisor of Industrial Arts
Board for Vocational Education
Springfield, Ill.

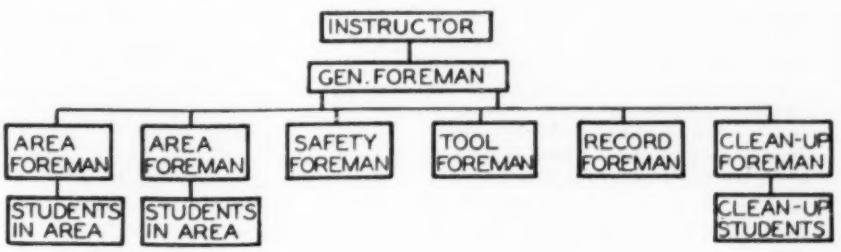
For many years teachers of industrial arts have been struggling with the problem of providing a wide range of experiences for their students to meet the objectives of an effective industrial-arts program. This has been a particularly knotty problem for the smaller high schools and junior high schools, since, in most cases, their entire industrial-arts program must be offered by one teacher in a single shop. For the smaller school where the provision of a widely varied industrial-arts program has been difficult or impossible and where the consequent contributions to education have been negligible or absent, the general shop type of industrial-arts organization has commonly been accepted as the most practical means of realizing a major portion of the functions of the general education aspects of industrial arts.

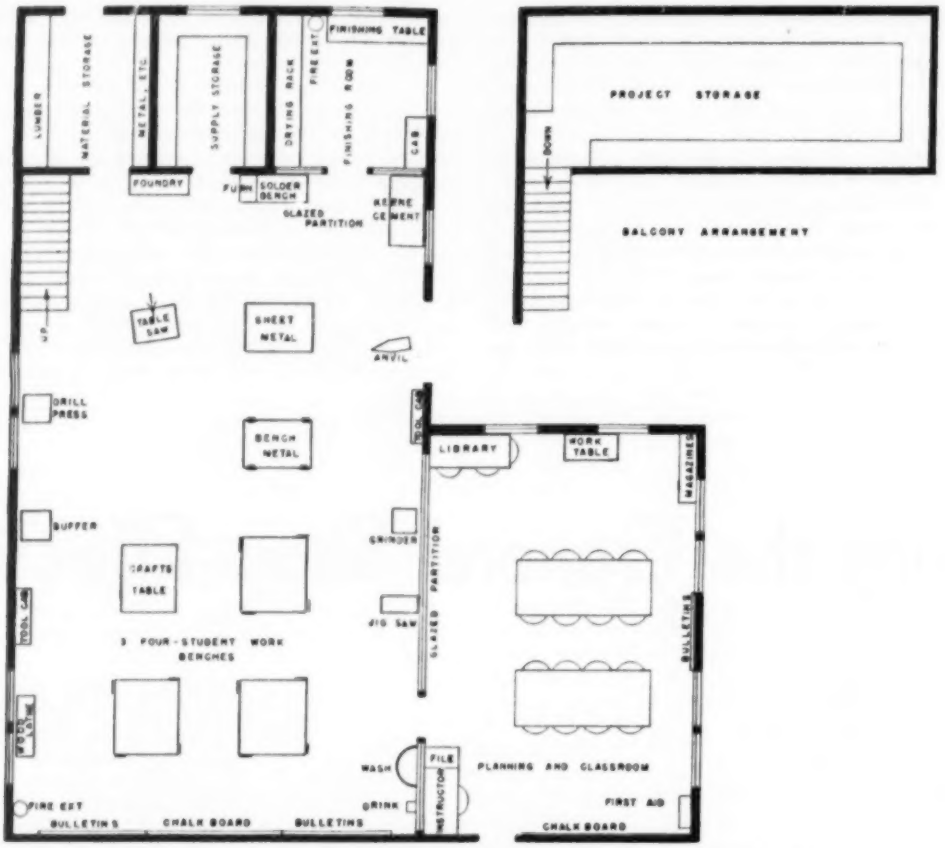
In spite of this apparent justification of the general shop as a panacea, it is somewhat disturbing to note that the actual results being secured in general shops over a period of years in many schools have posed some doubt whether the programs in actual operation measure up too well with the potentialities claimed for them in theory. It is true that only recently have many teachers had the opportunity for practical training in general-shop organization and operation. Accordingly, in the past, many teachers have attempted this type of shop organization without realizing the unique problems which inherently go with it. In some cases the general shop as set up has proved quite impractical in the minds of teachers due to difficulties of administration and operation which have been encountered.

It is believed that a major portion of the difficulties experienced in operating the general-shop type of organization stem from a definite and recognizable lack of planning on the part of the instructor operating such a program. There seem to be three phases of shop planning which are most likely to render a general-shop program ineffective if not fully carried out. These phases of planning are shop layout and organization, course of study organization, and personnel or student participation organization.

Shop Layout and Organization Necessary

The layout and organization of the general shop demand unusual foresight and planning on the part of the instructor. Since the shop will accommodate two, three, or four differing activities, each with its more or less specialized equipment, it is evident that all areas should receive equal consideration and thought in order to eliminate conflicts of use of space and equipment and to facilitate smooth operation of the shop. It is important that one or two areas of activity with which the instructor may be most familiar not be allocated more space or equipment than the activity represented justifies. It is recognized that many of the general shop layouts now being used in our older buildings are the result of a series of compromises. The room may have been designed as a unit activity shop, and





Shop layout by Amos D. Coleman, state supervisor of industrial arts, Springfield, Ill.

consequently is too small for a good layout of a multiple-area shop. In such cases, it seems wise to include only as many areas as can be adequately provided and equipped. Sometimes such circumstances limit the shop to only two or three activities or areas.

The determination of the best layout of a general shop for such areas as woodwork, metalwork, electricity, drawing, printing, and crafts can only be determined after a careful study of such factors as shop size and shape, natural and artificial light, electric power outlets, gas lines, storage facilities, and location and arrangement of auxiliary rooms. With these facts in mind, perhaps the best method of effective general shop layout involves the use of a scale drawing of the shop room, with models of machines, benches, tables, etc. (cardboard blocks may be used) which may be shifted about on the scale drawing of the shop until the best arrangement of areas and equipment is determined. By simply drawing around these models, a floor plan of the proposed shop is secured. All present and future areas and equipment will thus be located and fitted into the over-all general-shop organization, and the purchase of future equipment will be more easily justified.

Course Organization Important

Perhaps more unsatisfactory results in the teaching of a general shop program are traceable to the lack of definite course organization than to any other single factor. The complex nature of general shop activities makes a well-developed course of study mandatory. The fact that few textbooks are available which include a comprehensive course in all areas to be taught heightens the need for, and shows the importance of, a comprehensive teacher-prepared course of study. General-shop teachers have often found themselves in a maze of materials, tools, procedures, and projects with no guide either for themselves or their students. This often results in assigned busywork from day to day with little or no over-all aim in view. This type of teaching is poor in any shop, and will certainly fail in the general shop.

The course of study should contain information of a very definite sort. The general objectives of industrial arts should either be stated or be well understood by the instructor. More detailed specific objectives should next be set up. These are usually an application of the general objective of industrial arts to the specific area to be taught. Next should come a selection of the teaching units to be included. This is simply a list of the things the student is expected to be able to do at the end of the course. These teaching units as set up form the basis for projects and technical and related information to be detailed later. The jobs or projects chosen are the heart of the general-shop program. They must be justified upon the basis of the teaching units involved in each project. A project analysis chart, evaluating each project against the teaching units should be set up. Several projects at each level of difficulty should be provided as the student advances.

The above considerations, when completed, constitute the *doing* phase of the general shop course outline. The *knowing* phase of the outline is equally important and should be included in the total course outline. This is simply a list of the things the student should know at the end of the course. This list is frequently organized as technical information and related information.

The technical information is usually considered to be the information which the student must have to perform the activities listed in the teaching units. The related information is considered to be the information the student needs for the fullest understanding of the unit being taught. Both technical and related information references should be shown by title and page number to make them more usable by the teacher and student. An effective method of course organization involving all the factors enumerated above and correlating the *doing* and *knowing* phases of the program is shown in the following sample. Similar course outlines should be prepared in each area of the general shop which is being taught.

Personnel Organization Promotes Efficiency

The multiple and varied activities which are found in the general shop situation create a multiplicity of demands upon the instructor's time and energy. Many of these are routine matters, but still cannot be foreshortened or eliminated. If these duties are assumed by the instructor, he will find that his time which is available for actual teaching is greatly reduced. On the other hand, these routine matters may be delegated to members of the class with a resultant benefit to them from the acceptance and discharge of such responsibilities. Most of such duties can be discharged quickly at the beginning and end of each period and thus will not detract appreciably from the student's shop time.

If the personnel or student participation plan is to be used, it should not be put into effect without the co-operation and willingness of the students who are involved. Students usually readily accept the idea that such participation is desirable and necessary for smooth and effective operation of the shop, and can be made to feel that theirs is an important part of the total industrial-arts program. Such an organization within the shop classes affords one of the best opportunities which can be provided for students to actually participate in *democracy in action*. Again, it probably more closely parallels actual conditions in industry than any other part of the shop program.

Students should be permitted and encouraged to elect, after fair and thoughtful consideration, the personnel who will serve in the various capacities of the student personnel plan. These students should never be appointed by the instructor. Actually, the plan should not be attempted in the first place unless the students have expressed in a representative election procedure that they recognize a need for and desire to participate in such an organization. The instructor must take the lead in determining what the duties of each officer shall be, and see that they are agreed upon and posted. No duties should be included which do not directly benefit the class as a whole. The plan should be simple enough to be easily administered, and should give equal opportunity for all students to serve in any of the offices.

The class will wish to set up its own rules for the selection of officers, term of office, and duties to be discharged. This should be done in a democratic manner, with each student having a voice in the regulations. It is important, however, that such rules of elections, term of office, duties, etc., be clearly and concisely stated, and that the instructor insist upon their discharge after the plan is in operation. Definite lists of duties assigned should be posted on the shop bulletin board, and also given to each student in the personnel organization. Some instruction in how to proceed will be necessary each time new officers are elected if the group is to get off to a good start. It is understood that no student should be asked to serve against his wishes in any capacity of the organization.

General Foreman

1. Calls class to order.
2. Checks to see that all duties are performed.
3. Appoints all substitute officers.
4. Runs class under teacher's supervision.
5. Acts as instructional assistant.
6. Supervises area foremen.
7. Takes care of class dismissal.

Area Foreman

1. Responsible for operation of his area.
2. Has charge of all workers in his area.
3. Sees that all students in area are supplied with materials, etc.
4. Keeps record of supplies individual pupil receives.

Safety Foreman

1. Checks all machines and room in general at beginning and end of hour for safe operation.
2. Posts safety material (posters, charts, slogans, etc.).
3. Reports safety violations to the general foreman.
4. Gives safety instruction as the need arises.
5. Works with instructor in making needed repairs.
6. Administers first aid (minor injuries).

Tool Foreman

1. Checks all tool cases or panels at beginning and end of each period for broken or missing tools.
2. Reports tools missing at end of period to general foreman.
3. Checks out and keeps a record of tools taken out of the shop.
4. Keeps tool inventory up to date.

Record Foreman

1. Takes roll.
2. Keeps record sheet.
3. Takes care of folders which contain students' work in graphic arts.
4. Locks and unlocks lockers.
5. Reports absentees to office.

Clean-Up Foreman

1. Gives signal for clean-up period.
2. Supervises clean-up of desks, machines, etc.
3. Supervises sweeping of floors.
4. Arranges rotation plan for student helpers.
5. Checks entire shop to see that it is in good order before class leaves.
6. Reports to general foreman when shop is ready for class dismissal.

It is recognized that there are many factors other than those presented which help to determine the effectiveness of any general-shop organization. It is believed, however, that if the general-shop teacher has worked out for himself the best possible shop layout under existing conditions; if he has succeeded in organizing his course of study and in developing instructional materials in each area taught; if he has developed and put into operation a practical personnel organization; then he has gone far in developing the essential features of an effective general shop program.

Families in America are getting more fresh fruits and vegetables, thanks to the increased use of a new packaging material, polyethylene. Made into attractive, transparent, bags, the oil-derived polyethylene is helping change traditional shopping habits of housewives in America, enabling them to buy prepackaged fruits and vegetables at their best. About 600 million square yards of polyethylene film were used for packaging in 1953, and predictions are that more than half the fresh produce bought by housewives soon will be packaged in polyethylene bags. Oil, in its countless forms, helps America's food supply along from farm to table. — *Petroleum Newsnotes.*

Farmers in the United States use twice as much petroleum-driven horsepower as the total consumed by all the nation's factories.

— *Petroleum Newsnotes*

Besides providing employment for nearly one out of every 37 persons in the United States labor force, the oil industry offers excellent wages, good working conditions, and steady jobs. — *Petroleum Newsnotes.*

Leaders in Industrial Education

WILLIAM T. BAWDEN
Emeritus Professor of Industrial Education
Kansas State Teachers College
Pittsburg, Kans.

HOMER JOHN SMITH

(Continued from page 268 of the October, 1954, issue)

Impact on General Administrators

A most significant fact to note in Dr. Smith's career is that he is one of the very few leaders in industrial education who have been successful over long periods in securing an attentive audience with general school administrators. In this service to the cause he has been unusually effective and influential, both in his writing and in his personal appearances before conventions and conferences. A brief statement concerning one such appearance must suffice by way of illustration.[8]

This is a paper read before the Atlantic City convention of the American Association of School Administrators of the National Education Association, formerly the Department of Superintendence. This is without question the most representative and influential organization of school administrators in the country, and the invitation to appear before it was not only signal recognition of Dr. Smith's standing as an educator, it was also an indication of interest in high places of the movement for which he stood.

He opened his address with the challenging statement that, "administrators cannot be expected to help us much on the *hows* of our work, but they can and must understand and control the *whats* of our work, in keeping with the *whys*. Aims and types of industrial education are squarely within the province of the administrator."

Whenever it is proposed to introduce a new subject of course of study, or to organize a new department or a new school, Dr. Smith counseled, the important questions are: "What group or groups of individuals will it serve, and for how long, and how well will it serve them?"

He discussed two types of industrial education, the general and the strictly vocational. "Administrators should not think of them as being mutually exclusive, but must work to make them function harmoniously, as closely allied and interdependent parts of a complete service."

In discussing industrial education at successive school levels, he recommended that "all elementary school pupils should receive manipulative experiences of some kind, for such expression helps in their complete development. In junior and senior high schools, provision should be made for more election, with some students needing concentrated industrial work and others demanding very little. Vocational education should be given as much scatter as our every means will permit. . . . Senior high schools and junior colleges must take the *can* and *will* approach, rather than the *can't help* attitude.

"Above all, let us study our people, young and old, in school and out, in terms of groups. Let us learn their difficulties, and heighten their morale; let us supply their needs and safeguard their work-span and old-age securities. . . . The problem varies as the school or the community."

In another connection he declared: "If we are to continue to substantiate our claims for the industrial subjects as necessary parts of a general education, and as having both guidance and training values, we must be certain of these things: The courses offered must broadly explain industry; the content of the courses must be a fair sampling of the skills and knowledges of the crafts selected; the teaching methods must be as varied as the difficulties of students and of subject phases; the manipulative work assigned must picture the life of the mechanical workman."

Reviews and Bibliographies

Another phase of Dr. Smith's service to general educators has been a long list of reviews of books, through which he has authoritatively interpreted the aims, purposes, and philosophy of industrial education to school administrators and other students of education. These reviews, for well over 30 years have been contributed from time to time to *The School Review*, *The Elementary School Journal*, *Minnesota Journal of Education*, and other similar journals.

In addition, beginning in 1933, he has contributed to *The Elementary School Journal* and to *The School Review* an annual annotated bibliography of current material on industrial and vocational arts, as adapted to instruction in elementary schools, and secondary schools, respectively. Excluding books and magazine articles dealing with technical subject-matter phases of shopwork and drafting, of interest primarily to shop teachers and other specialists, the lists have consisted of selected references treating the three main aspects of instruction: (1) curriculum, (2) methods of teaching, study, and supervision, and (3) tests and measurement.

Mention should be made at this point of the following notable contributions to the work of students in this field, more or less closely related to the foregoing:

Classified References on Related Subjects for Trade Education, including Related Science, Related Mathematics, Related Drawing, *Vocational Education Magazine*, October, November, 1922; January, 1923.

Teaching Aids for the Asking, Bulletin of the University

[8] Homer J. Smith, "Aims and Types of Industrial Education" INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, Vol. 28, No. 2, Feb., 1939, pp. 45-47.

of Minnesota Press, 1928, 60 pages. A list of more than 500 booklets, circulars, wall charts, and the like, procurable free or at nominal cost from manufacturing and sales organizations; selected, classified, annotated.

Occupational Descriptions and Their Uses, *Vocational Guidance Magazine*, May, 1929.

Objective Measurement in Industrial Education, *Industrial Education Magazine*, March, 1930. For the first time an exhaustive list of "Objective Tests in Industrial Education," and a list of "Periodical References on Testing in Industrial Education."

One Thousand Problems in Industrial Education, Bulletin of the University of Minnesota Press, 1931, 90 pages. A list of titles appropriate for term papers, for theses by graduate students, and for practical research by men actively engaged in teaching, administration, and supervision.

Major Publications

Dr. Smith is author of an impressive list of books, bulletins, and reports, as well as of articles contributed to professional journals and proceedings of conventions far too numerous to be catalogued here. In addition to those already referred to, the following publications should be mentioned:

Industrial Education: Administration and Supervision, The Century Company, New York, 325 pages, 1927. Report of a study of the duties and methods of directors and supervisors of industrial education, both general and vocational, in 120 large cities, with suggestions for improved practice, and for professional training.

English for Men and Boys, Ginn and Company, Boston, 1923, 330 pages.

Automotive Repair for School and Home (with Roy S. Kern), The Manual Arts Press, 1925; revised, 1933, 120 pages.

Industrial Arts in Modern Education, The Manual Arts Press, 1934. 168 pages. Member of Editorial and Publication Committee, and Author of Chapter 4, Administration and Supervision.

Industrial Arts: Its Interpretation in American Schools, U. S. Office of Education, Washington, D. C. Bulletin, 1937, No. 34, 125 pages. Member of the Conference, and of the Publication Committee.

Improving Instruction in Industrial Arts, Bulletin of the American Vocational Association, Washington, D. C., 1946. Member of the Committee, and Chairman of the Editorial Sub-Committee.

For one year, 1938–39, he served as Guest Editor, *Industrial Education Magazine*, The Manual Arts Press, Peoria, Ill.

Field Work

In addition to his duties on the campus of the University of Minnesota, and his voluminous writing, Dr. Smith has somehow found time for an almost incredible number of appearances at conventions and conferences, and visits to schools. I have been permitted to examine a summary of these "goings and comings," compiled by his secretary for one ten-year period, which showed a total of 357 appearances, in 24 states and the District of Columbia. Counting the academic year at ten months, this represents an average performance of not far from four "activities" per month, which must be something in the nature of a record for an educator not employed primarily for this type of work!

Personal

In conclusion, I am happy to pay this tribute to a valued personal friend, a close associate in a number of significant undertakings, and a source of inspiring leadership through the years. As his official retirement from active duty at the close of the academic year, 1953–54, has been accomplished, and as he has embraced the opportunity to lay down some of the prescribed routine burdens of an exacting professional career, I know his mind must still be full of anticipations as he continues to contemplate the privilege of revising his daily and weekly schedules with the view to eliminating a few things that will then seem like chores, and of somewhat less consequence, and to indulging in some cherished activities that he has heretofore found difficult to enjoy.

Out of the happy experiences of nearly three years of retirement, I believe I am well qualified to welcome Dr. Smith to a new mode of living, and to congratulate him on the prospect that is now about to open up before him. I could even enter into detail on the attractions of Sunny California, but I am wondering how far good taste would permit me to go on this occasion.

Dr. Smith's personality is best summarized as genial, appealing, a scholarly gentleman. It has been my privilege to know him, in many relationships, for nearly 35 years. I have seen him in action in many situations. In all that time I have never known him to be anything but considerate and courteous, even to critics, crackpots, bores, and troublemakers. He has an unfailing sense of humor and of the fitness of things; and a readiness with the right word at the right time.

I think I understand the basis for the respect, devotion, and affection of his students. As one of his former students has so well said, in speaking of his outstanding ability as a teacher: "While his professional writings, and the record of his speaking engagements, are impressive indeed, his outstanding attribute is that of the classroom teacher." When one has said that, he does not add to it, or reinforce it by assembling statistics, or by submitting graphs and diagrams.

You simply take my word for it. Homer J. Smith is one of the choice spirits of our day. Though our paths may not cross as frequently as we would like, we shall continue our cherished friendship through the years that lie ahead.

Oil industry production of motor fuel for the millions of cars, buses and other vehicles which Americans take more or less for granted rose in 1953 to one billion 289 million barrels, enough to fill the world's largest reservoir (Lake Mead in Arizona-Nevada) over five and a third times. — *Petroleum Newsnotes.*

More than 120 different petro-chemical products are produced in the Gulf Coast by approximately 75 plants. These products range from carbon black for use in automobile tires to nylon salts used to make ladies' stockings. — *Petroleum Newsnotes.*

Industrial Arts and Vocational Education

JOHN J. METZ, Editor

AVA CONVENTION — DECEMBER 2–7, 1954

SAN FRANCISCO with its fine historic, natural, and educational riches, beckons all teachers of industrial arts and vocational education to attend the 1954 AVA Convention which will open in that city at the general session Friday, December 3, at 7:00 p.m.

The agricultural division will start its meetings at 8:00 a.m., on Thursday, December 2. The final meeting will be held on the following Sunday afternoon. The Sears Foundation annual farm tour is scheduled for Monday.

Dr. Lynne C. Monroe, professor, University of California, Santa Barbara College, and program chairman for industrial arts, promises a program for the industrial-arts section packed with discussions that will be interesting, instructive, and helpful to all in the fields of industrial arts and vocational education.

Besides discussing the industrial arts from the viewpoints of the superintendent, the state director, and the everyday citizen, there will also be a program on the use and general operation of educational television in the field.

Then there will be demonstrations on the graphic arts, woodworking, electricity, and arts and crafts on Saturday morning.

A research meeting will present an overview of the results of studies made of the most recent developments in the field of industrial arts.

Charles W. Patrick, director of vocational education, San Diego, Calif., and program chairman for trade and industrial education, promises a Saturday afternoon meeting in which a national leader of organized labor, and an official of a national management association will show what they individually expect of industrial arts and vocational education.

Lee Ralston, director of vocational education, Los Angeles County Schools, is organizing this program.

Friday has been designated Apprenticeship Day. The climax will be an apprenticeship graduation.

Recent trends in supervisory training will be discussed on Monday morning.

Of course, the manufacturers and dealers of tools, materials, and equipment used by the schools, and teachers of industrial arts and vocational education will be there to exhibit their new and improved wares. This comprehensive display which is a large part of what the attendance at the AVA convention offers, is in itself a vital reason why all those interested in industrial arts and vocational education ought to flock to San Francisco during the AVA convention December 2 to 7, 1954.

All of the planning outlined in the foregoing is, of course, of no avail if the membership is not present to make the best of what is offered.

Administrators, directors, principals, supervisors, and instructors of industrial arts and vocational education subjects and schools should not fail to attend. The program seems replete with professional materials which all can take home to make their programs more efficient and worth while.

WHAT CONSTITUTES A GOOD SHOP TEACHER

WHAT are some of the attributes which the good shop teacher should have?

Naturally one might make a long list of such attributes but let it suffice to mention only a very few points which outstanding teachers possess, and which, no doubt, are the characteristics which make them good, if not master shop teachers.

The first earmark usually is that they practice self-discipline. They are always prompt themselves, because they have trained themselves never to demand anything of their students that they do not ask of themselves. A class that is not started on time is not setting the right standards for promptness to the students, and may be the cause of developing slovenly time keeping habits in the class.

Be friendly and approachable especially to your students. We grownups know what it means to have a cold, stern, unfriendly superior in office, shop, or business. Children are just as sensitive as we are and they enjoy being treated as human beings.

Be a good disciplinarian. Get the students to work with you rather than against you. Let them know what is expected of them and adhere to the rules of the game with fairness and firmness — but don't be a martinet. Do not let the misbehavior of a few cause you to be surly and unfriendly to the entire class.

Be sure to know your subject well. Students have an uncanny faculty in detecting a teacher's weaknesses. Do not bluff however. If you don't know the answer admit it, but make efforts to find it out.

Gather and have your students help you gather as much related information pertaining to your subject as possible. This will help both you and your students, and it also will furnish much material for your lesson sheets and your bulletin board.

Be ready to give credit where that is due. A kind word is better than many words of criticism. Develop the family spirit in your classroom or shop and both you and your students will enjoy schoolwork better.

THE COST OF CARELESSNESS

THE above title was used by the general manager of the Association of Casualty and Surety Companies for his talk on safety when speaking to New England business executives and safety specialists at the Maine State Safety Conference in York Harbor.

He emphasized that in 1953, 95,000 lives were lost in this country, most of them because of preventable accidents, and that 9,600,000 suffered injuries, all of which cost our country the loss of $9,700,000,000 in money. The enemy who caused all of this was our own indifference and carelessness.

He pointed out that this tremendous loss would have provided us with 100 fully equipped infantry divisions instead of the 18 which we now have. Or we could have provided ourselves with 100 — 45,000-ton Midway class aircraft carriers, or 2700 B-36 intercontinental bombers, or we could have purchased 1300 — 500-bed hospitals, or 7500 new schools to house 7,500,000 children, or 800,000 three-bedroom homes, each valued at $12,000.

Information such as this cannot help but startle us and probably it may help us all — adults and children — to become more careful and safety minded.

School of Many Skills, Quito, Ecuador

CARLOS DAVILA
Former President of Chile, now on the U.N. Technical Assistance Program
United Nations, N. Y.

"There it is! I can see the name on the wall — SENAI."

The cry from the man in the front seat of the motor coach caused the rest of the group to peer excitedly through the coach window at the long, modern-looking building that seemed to combine the appearance of a university with that of a modern industrial plant.

Two days before they had been in Quito, capital of Ecuador; now they were in a quiet residential street on the outskirts of Rio de Janeiro, and they were reaching their destination — the Rio headquarters of SENAI, the Brazilian National Industrial Apprenticeship Service.

The coach pulled up in a wide yard behind the front building. Stiff from travel, the passengers clambered down. There was nothing fancy about their luggage; their suits had the vaguely ill-fitting look that marks the worker's Sunday best. Their faces were alert, intelligent — and reflected their curiosity; not the casual curiosity of the tourist, but the more serious feeling, not without a tinge of anxiety which a youngster feels on joining a new school, or a grownup experiences his first day at a new job.

For them, in fact, this was both a new school and a new job. They had been selected for special industrial training classes organized jointly by the Brazilian Government and the International Labor Organization in a remarkable two-way technical assistance project to train skilled labor for Latin America.

They were coming for a special vacation course lasting ten weeks. A few weeks before 99 worker-students from 18 Latin American countries had completed a nine-month course on fellowships offered by the Brazilian Government. With the reopening of the SENAI schools in March, after the Brazilian summer vacation, another full course jointly organized by the ILO and SENAI was scheduled.

Angel Nunez, from the ILO office in Brazil, and Dr. Donezetti do Rego Monteiro, director of the SENAI in Rio de Janeiro, welcomed the newly arrived Ecuadorean contingent and gave them the background to the important project in which they were now participating.

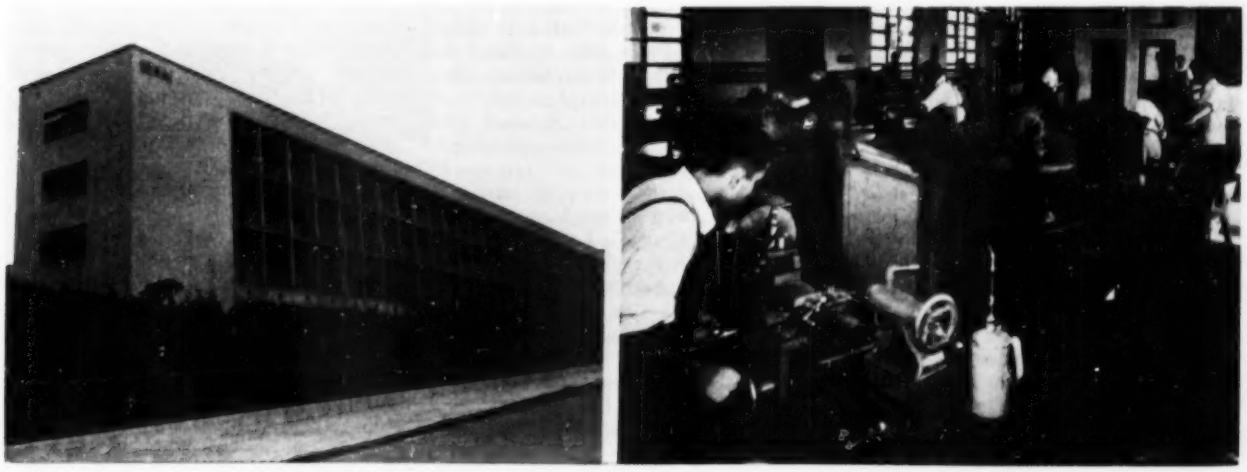
SENAI is financed by industry through a 1 per cent tax levied on the amount of wages employers pay to their employees, and has established a network of industrial training schools throughout Brazil. The biggest of these are in Sao Paulo and in the capital, Rio de Janeiro.

Forty-three different trades are taught in Senai schools covering various branches of the following industries: metal, printing, carpentry, radio, automobile repair, electricity, spinning and weaving, shoemaking, glass, building trades, engraving, jewelry, and clothing.

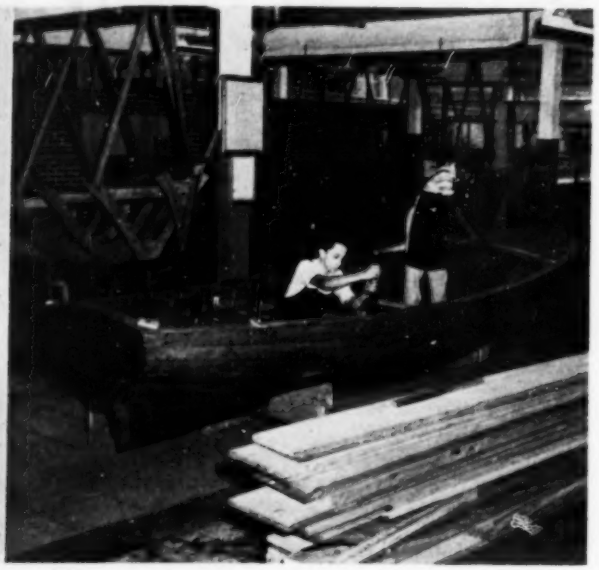
Through SENAI, Brazil is training the skilled technicians she needs for her expanding industries.

In November, 1951, Brazil entered into a *give and take* technical assistance agreement by which Brazil agreed to extend its technical education facilities to trainees selected by the ILO from other Latin American countries.

In return, the ILO undertook to help develop the schools by providing instructors, equipment, and books. It is, in effect, a triangular arrangement: the ILO helps Brazil and, in return, Brazil helps her Latin American neighbors to develop their technical training programs.



General view of the SENAI industrial training center, Rio de Janeiro, Brazil; (at right) Machine shop of the joint training center, Sao Paulo, Brazil



The auto-mechanics shop at the training center in Rio de Janeiro, Brazil; (at right) Boat-building at the training center in Sao Paulo, Brazil

The ILO's part of the arrangement is to provide 15 experts to guide and train SENAI instructors; a wide range of instructional material including books, visual aids, and correspondence courses. In addition, 13 ILO fellowships were to be given to SENAI officials for advanced training abroad.

The Brazilian government was to place three SENAI instructors at the disposal of the ILO for two months each year for technical assistance missions in other parts of Latin America; to grant 100 fellowships and 100 correspondence courses in vocational training to instructors selected by the ILO in other Latin American countries.

The SENAI fellowships aroused interest throughout Latin America. For the first 100 vacancies, 1122 applications were received. A committee of two — one from SENAI and one from the ILO — visited all the countries concerned and interviewed the applicants personally. The number of fellowships awarded by country was as follows:

Argentina 1, Bolivia 8, Chile 3, Colombia 6, Costa Rica 8, Dominican Republic 6, Ecuador 7, Guatemala 7, Haiti 8, Honduras 6, Mexico 4, Nicaragua 5, Panama 6, Paraguay 7, Peru 5, Salvador 7, Uruguay 4, Venezuela 1.

The successful candidates arrived in Brazil during March and April, 1952. Their course lasted until December of that year. The excellently equipped workshops at the SENAI schools in Rio and Sao Paulo gave them full facilities for practical training as well as theory.

Besides the classes for international worker-students, SENAI has, of course, continued its own classes for Brazilian apprentices and its special teacher-training classes for sixty Brazilian instructors drawn from local SENAI schools all over the country.

These have benefited from the presence of the experts sent by the ILO in accordance with the agreement. Nine of these arrived last October. All were specialists in their different trades and seven were French, one Swiss, and one Dutch.

There were Andre Agnan, professor at the Dorian Technical College run by the City of Paris, and an expert in heat treating in metallurgy; Robert Berthillot, works manager of a timber training center at Crepieux and a specialist in furniture designing and cabinetmaking; Raymond Bouffilh, works manager of a printers training center in Paris and an expert in offset printing; Marcel Desbois, technical professor at the Ecole Normale Nationale d'Apprentissage of Paris, who is giving instruction in automobile mechanics; Alex Froger, assistant technical professor at the Lycee Paul Langevin, Suresnes, who is teaching Diesel engine mechanics; Pierre Laplanche, professor and works superintendent of a training center at Courbevoie, who is teaching tool and die making; Francois Larbec, assistant director of the French national apprenticeship training center at Lyon, who is giving instruction in industrial education methods.

From Switzerland there is Serge Pretre who is teaching general mechanics. Joseph A. Conen of the Netherlands, a former instructor at the Amsterdam School of Graphic Arts, is teaching photolithography. A Canadian, Archibald Kerr, is an expert on occupational classification.

The twenty Ecuadoreans whose arrival we witnessed last February for the special vacation course were taking classes in weaving, welding, photolithography, bookbinding, offset printing, and auto mechanics.

The ILO was paying their fare both ways and in addition giving them a subsistance allowance of 3000 cruzeiros a month.

That first day, as they toured the various workshops on a preliminary tour, they could ill restrain their impatience to try out the machines and equipment. Some took off their jackets and rolled up their sleves so that they could handle some of the machinery.

The reaction of Francisco Brito, a 27-year-old textile worker from Quito was typical.

He reeled off for us the things he would learn at the SENAI course: new pinning and weaving techniques, screen printing on cloth, textile research, covering such questions as weight, density, tension and elasticity of different yarns, how to operate the latest electric-power looms.

"It's the chance of a lifetime," he said.

Manuel Araque, a 23-year-old worker from the repair shops of the Ferrocarril de Norte, Quito, was delighted to have a preliminary tryout on an electric welder.

"I told them back in Quito that I would soon be making the sparks fly," he said with a cheerful grin. "But I didn't think it would be so soon."

Two of the group were from the Instituto Geografico Militar in Quito. Jorge Ortiz had come for a special course in offset printing while his col-

league Gonzalo Vargas was to take lessons in photolithography.

They told us they had often talked about improving their technical knowledge of these subjects but somehow had never been able to realize their hopes. The SENAI-ILO scheme had provided the opportunity.

The reaction of the 99 fellowship holders who had taken the longer course had been the same, one of the SENAI instructors assured us. They had all been grateful to come, eager to learn, and not unmindful that they owed it to their own countries to get the utmost out of the course.

In a tour that had taken us through eight countries of Latin America, we had seen, as members of an information mission sent by the United Nations and specialized agencies, many different types of technical assistance . . . governments being helped to harness water power for hydroelectric plants; to develop their natural resources in the way of forests and minerals; to help them to improve their crops and their cattle; to knit up key communities with the essential links of roads, railways and air routes; to protect their peoples from disease and to give them better houses and schools.

Here we were seeing another important aspect of this program of mutual aid without which ambitious plans for the industrialization of Latin America could not reach full fruition — the pooling of skills to train the key workers to man the machines and teach the instructors who could in turn pass on to others the mechanical knowledge so vital in this modern age.

Problems and Projects

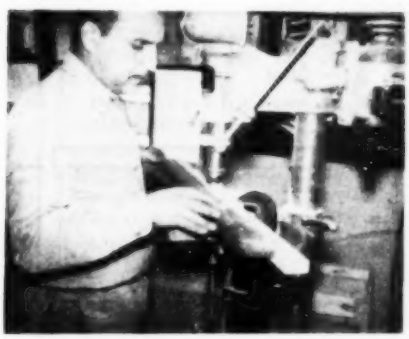
RECLAIMING WINDOW SASHES

JOSEPH LONGO and ROBERT COTA

Marinette Vocational and Adult School

Marinette, Wis.

A friend and myself were reclaiming and cutting down some old window sashes into smaller size windows but ran into trouble cleaning the putty, glazier points, and small brads out of the sash rails. Scraping was too slow and invited nicked knuckles and gouges in the wood when the scraper slipped.



Using the drill press for cleaning out old putty and glazier points

We clamped a strip of wood to the sensitive drill press table, set the strip for our width of cut, and locked the spindle for the proper depth. The tool we used was a high speed end mill chucked directly into the chuck. The drill press was set at the highest possible speed and production began. The end mill cut through putty, glazier points, old paint, and brads with equal facility. With a few resharpenings and a few hours of work we cleaned up enough sash rails for 44 windows.

THE PLACE OF A PRODUCTION JOB IN INDUSTRIAL ARTS

ROBERT LENTO

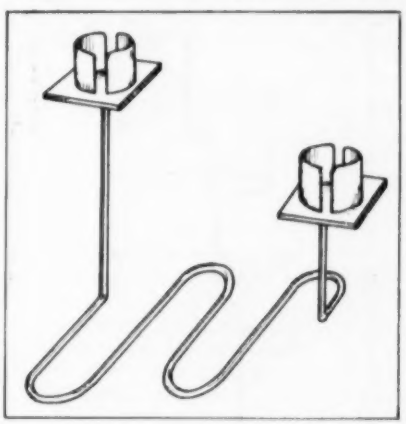
Industrial Arts Department
The City College of New York
New York City, N. Y.

The mention of a production setup in an industrial-arts shop usually brings the criticism that it "burns up too much time." This criticism is not necessarily valid as is witnessed by the job my class ran off last semester in a relatively short period of time. The total time used up by the class was between three and four full meetings.

Let me explain exactly how the time was used by our class in comprehensive metalworking, under the guide of Professor George Keane of the City College of New York.

The idea of the job was originally Professor Keane's and in preceding semesters two such jobs had been successfully carried out. The whole procedure was divided into three main parts: planning, execution, and discussion report. The first step was the choosing of three members of the class to act as a *committee*. This committee consisted of a foreman, an engineer, and a businessman. In this project I acted as the engineer. Working as a team the committee sought a project for the class to mass produce, while keeping in mind the following limitations: materials, shop equipment, adaptability to production, commercial value, and the appeal of the item to the majority of the group. After three weeks of searching the committee presented a condensed group of projects to the class for approval and discussion. The class time involved thus far is about one meeting.

With the planning completed the members of the committee moved on to the second step. Here the engineer and the foreman actually made a prototype of the piece to be produced, and in so doing gained an insight into the problems that were to be encountered in the actual mass production of the piece. Our group had decided to make a wrought iron and brass candelabra, and of course that was the piece we experimented with. While the foreman and the engineer were so engaged the businessman investigated the materials available in the shop and the source and price of any materials to be obtained outside of the shop. Our agent found that the ¼-in. stock that



The candelabrum produced by the production method

we needed for the job was not available, so he contacted a dealer and ordered the necessary material. Each student was then asked to contribute one twelfth of the cost of the materials to be purchased, in this case fifty cents. This money was taken in the form of a loan to be repaid by the sale of extra pairs of the candelabra to be made for that purpose.

As soon as the sample piece was completed it was shown to the group for final approval. Then the engineer set about designing and making jigs for the job while the foreman and the businessman worked on the distribution of jobs and the wage scale for the class. When the jigs were completed and the bugs were out of them each student was given his job and any necessary instruction in the execution of the job. Then a few sample pieces were run through the "line" for practice.

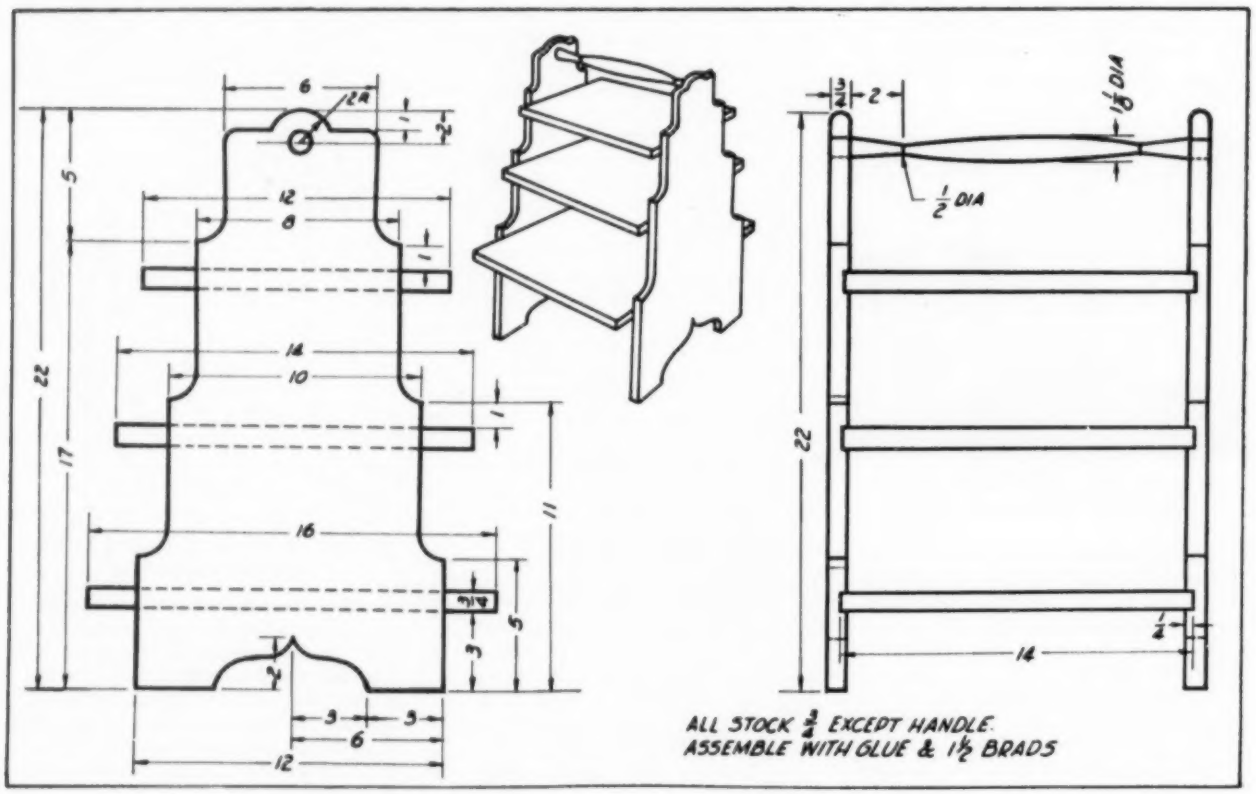
On the day the job was to be run off the committee arrived early and got things ready for the rest of the group. As soon as the class was assembled the hour was noted and the job was started. Now it became the job of the foreman to see that things ran smoothly. As far as was possible the bottlenecks were broken as they turned up and all problems were experienced by the group and noted for later discussion by the foreman. We didn't complete the number of pieces we had planned on at the first meeting so we worked a little longer at the next meeting. Now we have used about three and a half class meetings on the job.

The third and final step was the discussion-report portion of the project. Here we discussed the following general topics: the actual problems which arose in the course of the production job; the problems incurred in setting up the job; the value of the experience for us as students and as prospective teachers and individual observations and suggestions for improvement of the setup. In the discussions of problems incurred the businessman reported on the unit cost of production over a three-month period of actually manufacturing the piece. He arrived at a dollar and a half per piece. Then a discussion of the whole business end of the job ensued and included such items as the rental of the bullding, the depreciation of the machines, cost of materials, increases in efficiency as time went by, wages, insurance, loans, cost of utilities and others. (All of which were included in the calculation of the unit cost.) The engineer explained the development of the job and the designing of the jigs and the foreman discussed labor problems. Improvements in methods and materials were discussed by the class and finally the money obtained from the sale of the extra candelabra was distributed. Total class time about four meetings.

There is the job as we did it on the college level but it can be done as successfully on any level of education. For the lower levels the teacher gives more help to the committee and the project is kept generally more simple. The project in itself doesn't matter, it's the conception of mass production that is important. As a vital part of commercial industry it is certainly a part of industrial arts. If the project is carried on in conjunction with other classes in the school it can be very valuable from an *academic* point of view. The social studies classes for example could study a unit on mass production and how it has affected our American way of life, while the experience of mass production could be obtained in the shop. This type of integrated academic and *manual* study makes school more like real life and thus more interesting to all levels of student intelligence.

To carry this integration idea a little farther the mathematics teacher could help the committee with the calculations necessary on the job, and the English teacher could have the students involved write a report on their part in the project. Other industrial-art areas can also be helpful, mechanical drawing for example, in jig design. Actually the amount of integration possible is quite great.

More than half of the oil wells in the United States are still producing, although some are more than 50 years old. — *Petroleum Newsnotes.*



Magazine rack by Louis Barocci, Cudahy High School, Cudahy, Wis.

THE DEVELOPMENT OF THE LOOM

SHELDON W. COLE
Florida A. & M. University
Tallahassee, Fla.

While textiles have become a major aspect of our industrial life, it has also become an intimate part of our educational program. The loom, the basis of the textile industry, can be more readily appreciated if its background and development is understood. The purpose of this bit of research is to obtain an appreciative understanding of the looms and the textile industry.

The Principle of Weaving

The process of weaving consists of interlacing, at right angles, two or more series of flexible materials. The longitudinal thread or material is called the *warp* while the transverse material is called the *weft*. The essential operations of weaving are invariably three and they always follow each other in the same order. It does not matter how simple or complicated the interlacement may be, these three operations are always necessary and must be repeated over and over until completion. The operations are as follows:[1]

1. Opening the warp — that is, lifting certain threads of the warp, which have been previously stretched on some kind of a frame and depressing others, so that the weft can be passed between them.
2. Passing the weft, either by fingers or wound on some kind of spool or shuttle, through the opening thus made.
3. Beating successive lines of weft together with some kind of tool, generally formed like a comb. A different set of threads are passed through an opening and by this means the interlacement of warp and weft is effected.

The instrument used to carry out this process is called a loom. The term loom comprises every kind of cloth-weaving instrument from the simplest wood frame to the complicated power driven apparatus of modern industry. The growth of the loom has been greatly influenced by many economic and social conditions and in turn has been highly responsible for our present industrial structure.

Primitive Looms

1. The Early Primitive Looms

The necessity requiring the use of a form of loom began with the early primitive man. The necessity for such could be seen in the need for protective devices for the cave and armor against aggressors. Matting and covering was also necessary for the floors of the caves. These were often made from plants, rushes, and grasses. The difficulty arose in the process of interlacing or weaving the material together.

One of the methods primitive man adopted was to tie one set of strands or the *warp* to a low hanging branch and apply stones to each end to hold it down while the other strands or the weft were woven under and over the other strands.[2] See Figure 1.

Another method, that later evolved, was to tie the lower end to a broken branch resting on the ground and from this would develop the plan of a separate frame. This frame consisted of four branches fastened into a rectangle and used either vertically, propped up against some support, or horizontally. The worker, in either instance, sat upon the ground with the loom placed over his legs.[3]

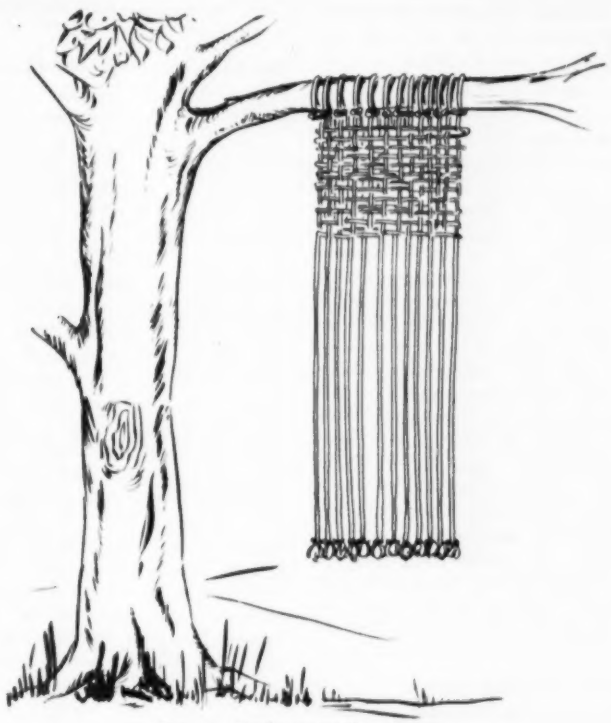


Fig. 1. Early primitive loom

2. Looms of Ancient Egypt

In ancient Egypt weaving was said to have been highly developed, however, there seems to be but a few accounts of the types of looms they used. These looms were constructed of two stakes driven in the ground which supported the cloth beam and the warp beam. A shed stick and rod heddle were used to form the shed. The weaver sat on the ground to operate. Later, from badly damaged drawings, it is seen that the looms were horizontally operated by two women. They were seated on either side of the loom to enable them to move with the cloth as it extends toward the warp beam. The woman on the left held the shed stick in front of what seems to be the rod heddle. The weft was beaten into place by a sword. Before the warp beam was a cord which served to keep the threads from becoming entangled.[4] Other evidence of the construction of the Egyptian looms was somewhat uninterpretative due to

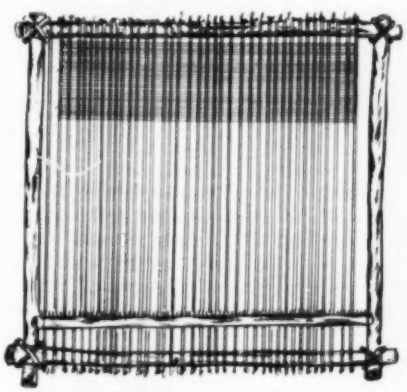


Fig. 2. Early Egyptian loom

[1]Hooper, Luther, *Weaving for Beginners* (London: Pitman and Sons, 1929), pp. 7-8.

[2]Hooper, Luther, *Hand Loom Weaving* (New York: Pitman Publishing Co., 1948), pp. 35-36.

[3]*Ibid.*, Hooper, p. 40.

[4]*Ciba Review*, "The Loom," Society of Chemical Industry in Basle, Switzerland, December, 1938, No. 16., pp. 546-547.

the badly damaged drawings. However, these descriptions dated back as far as 2100–1750 B.C. See Figure 2.

3. Greek and Roman Looms

Among the Greeks and Romans, however, weaving was a distinct trade and believed to have been done in comparatively large factory like workshops.[5] The construction of these looms, in 500 B.C., consisted of a crosspiece supported by two vertical posts which tapered upward. It was much taller than a man and had room for two weavers to work. It had a special beam for the cloth as well as the crosspiece at the top of the frame. In later construction, about A.D. 200, the shed was formed by pulling the loop rod with the hands. This made it possible to abandon at any time the orthodox principle of weaving, which consists of passing the weft thread across the entire breadth of the warp.[6] Weaving was such a distinct trade among the Greeks and Romans that each domestic establishment contained a loom together with the apparatus necessary for the working of the wool.

4. Looms of the Far East

In Asia the primitive and advanced weaving devices were found comparatively close together. Looms without a warp beam where the warp thread terminated in a rope of thread fastened to a stake, in the ground, are found in India and Japan. In a type of small loom, common in Japan, the warp is stretched by the weight of the weaver's body, as he leans back with the threads attached to a belt around his waist. Yet, the same loom has the comparatively advanced form of shedding harness worked by treadles.[7]

The looms used by the Indians of British India "consisted of two bamboo rollers, one for the warp and the other for the weft and a pair of gears. The shuttle performed the double duty of shuttle and batten and for this purpose was made like a large neeting neddle and of a length somewhat exceeding the breadth of the piece. This apparatus the weaver carries to a tree, under which he digs a hole large enough to contain his legs and the lower part of the gear. He then stretches his warp, fastening his bamboo rollers at a distance from others on the turf by wood pins. The balance of the gear he fastens to some convenient branch of the tree over his head, to loops under his gear, in which he inserts his toes, serving as tredles, and his long shuttle performs the duty of batten, draws the weft through the warp and afterward strikes it up close to the web."[8]

The Development of the Modern Loom

The vertical looms as known in Egypt, Greece, and Rome were familiar to medieval Europe, but did not become prevalent. The development of the loom connecting the primitive hand loom with the highly perfected type are somewhat vague and links between these are missing. The treadle loom appears in Europe as a perfected invention and in its most highly developed form. The draw loom certainly came from the Far East, and the idea of the treadle loom itself probably originated there also. A thirteenth-century Cambridge manuscript reproduces a treadle loom with all of its essentials. The weaver sat at his loom, a horizontal frame of a height convenient for him to work. The warp threads are kept tight by means of a lever attached to one end of the warp beam, the other being attached to the frame. This lever exerts pressure against the free end of the warp beam thus keeping the warp threads tight, yet allowing for a certain amount of elasticity. The lowering and raising of the shedding harness is done by means of the treadles.[9] The principle of the loom remained in many areas unchanged for as many as a thousand years. This was true of the East. It seemed that any technical changes to be made were left up to Europe.

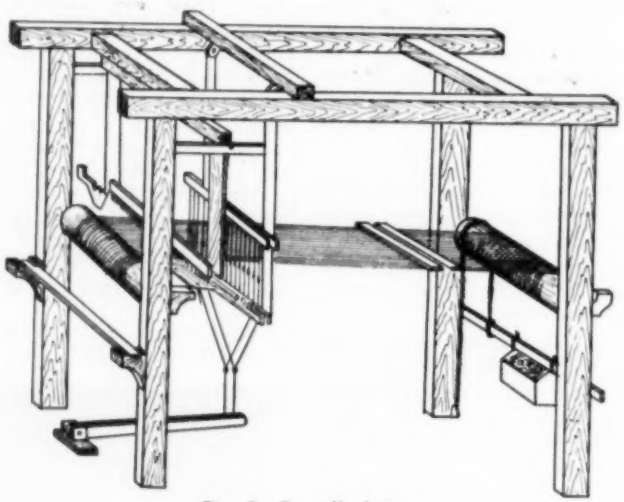


Fig. 3. Treadle loom

Several stories refer to the mechanization of the loom including the claims of Leonardo Da Vinci, in the latter part of the fifteenth century, as being one of the first who occupied himself with the mechanical loom. Another was Anton Moller of Danzig who, in 1586, is said to have invented a mechanical ribbon loom operated by a lever supplying the power. This, however, was never proved.[10]

During the early middle ages an increased demand arose in Europe for rich and elaborate materials. It was difficult to weave on the plain hand loom. The hand loom was naturally limited in the number of lined shafts and treadles which one worker could control. The draw loom allowed a wide scope in patterns. The shed was controlled by a series of cords attached to the heddle shafts, which were drawn in succession by an attendant. Later an automatic attachment was invented providing for mechanical shedding. In 1678 and 1745 M. de Ginres and M. Vaucason invented looms which embodied many modern principles but little was heard of them.[11]

Perhaps the most important changes on the looms began with John Kay in 1733, with his invention of the flying shuttle, the mechanization of one of the most important operations of weaving. The traditional method of passing the shuttle through the shed by hand was slow and required two weavers. The principle of the flying shuttle is that of a catapult. A picker or driver is set in motion by a suddenly tightened cord which projects the shuttle. The picker is then brought to an abrupt standstill after a short passage, thus shooting the shuttle through the shed.[12] In 1760 his son invented the multiple shuttle by making it possible to apply the principle of the flying shuttle to any required number of shuttles bearing

[5]Barlow, Alfred, *History and Principle of Weaving* (London: Gilbert and Rivington Printers, 1879), pp. 60–61.

[6]*Op. cit.*, *Ciba Review*, No. 16, p. 551.

[7]*Ciba Review*, "The Loom," Society of Chemical Industry in Basle, Switzerland, Dec., 1938, pp. 567–568.

[8]*Op. cit.*, Barlow, Alfred pp. 64–65.

[9]*Ciba Review*, "The Loom," Society of Chemical Industry in Basle, Switzerland, Dec., 1938, No. 16, p. 554.

[10]*Ibid.*, *Ciba Review*, pp. 558–559.

[11]Woolman, M. S., *Textiles* (New York: McMillian Co., 1926), p. 74.

[12]Faulkner, H. U., *American Economic History* (New York: Harper & Brothers Publishers, 1949), p. 252.

colored thread for different colored fabrics.

Progress in the development of the loom soon found the spinning wheels lagging, however, the inventions of Hargraves, Arkwright, and Crompton soon improved the spinning methods making better and stronger threads for weaving. In turn this called for a more improved loom. Edmund Cartwright, a minister, in 1784, after a two-year period of hard work devised a mechanical loom operated first by oxen power and later by steam engine. This loom shedded, picked and beat up the fabric by a system of cogwheels and gears in a homogeneous motion. Also a device for stopping the loom in case of the breaking of the warp or weft. It was later improved and became the basis for our power looms.[13]

The Looms at the Time of the Industrial Revolution

The hand looms having slowly passed away were rapidly being replaced by the power looms. They had, by their replacement of the power loom, been ushering in a new era.

The industrial revolution, in a sense, began with the textile industries which also laid the foundations for the inventions of other important devices. The improved loom of Cartwright was now meeting new changes. In 1814 Lowell introduced a power loom that must be operated by some mechanical force and also ushered in a system of housing the two processes of weaving and spinning under one roof. Still later, in 1830, Roberts invented a power loom that required little attention, from the weaver, and contained a majority of the aspects of our modern loom.

The added inventions to the loom, due to certain economic conditions has changed it from its once simple wood frame structure to a complicated power driven apparatus. This apparatus in the weaving process provides for the following:[14]

1. Raising and lowering the warp thread in a predetermined sequence so as to form two lines between which the weft may be passed.
2. Placing lines of weft between the divided warp.
3. Beating up each weft thread into its appointed position.
4. Letting off or holding the warp tense and delivering it as weaving proceeds.
5. Temples, for stretching the fabric widthwise, in order to prevent the edge thread of a warp from injuring the reed and breaking.

[13]*Ciba Review*, "The Mechanization of the Loom," Society of Chemical Industry in Basle, Switzerland, Dec., 1938, p. 558.

[14]*Encyclopaedia Britannica*, 14th ed., No. 23, p. 457.

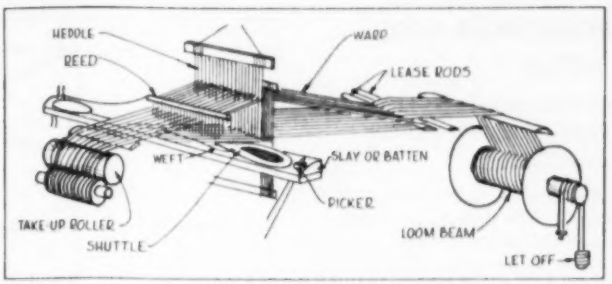


Fig. 4. Mechanism of present-day loom

6. Taking up or drawing away the cloth as manufactured.
7. A weft fork to stop the loom when the weft breaks or becomes exhausted.
8. Mechanism for stripping the loom when the shuttle fails to reach its appointed box.
9. Shuttle boxes for weaving cross strips, to bring different colors or counts of weft.
10. A device for stopping the loom when warp threads fail.

Modern Power Looms

The evolution of the loom has not changed in principle but merely in the complexity of parts and mechanism used to take the place of the hand and in the remarkable increase of products. The old operations of the loom are present but they are all done mechanically. The weaver merely has to watch the machine. One man can tend from four to six looms. All power looms without special appliances are limited to patterns because the pattern is dependent on the number of harnesses and only a comparatively small number can be used on one loom.[15]

On the primitive loom, in order to insert the filling yarns into the warp, the weaver had to raise each alternate warp yarn with his fingers or by means of a stick. On the modern loom, simple and intricate operations are performed automatically by the heddle frame. This is a rectangle frame to which a series of wires, called heddles, are attached. As the warp yarns come from the warp beam they pass through an opening in the heddles. As the harness raises the heddles which raises the warp yarns, the filling yarn is inserted through the shed by a small carrier device called a shuttle. The shuttle contains a bobbin of filling yarn. This yarn emerges through a hole in the side as the shuttle moves across the loom. All warp yarns pass through the heddle eyelets and through an opening in another frame that resembles a comb called a reed. The reed, with each picking operation, automatically pushes each filling yarn against the portion of the cloth that has already been formed. With each shedding, picking, and battening operation the newly constructed cloth must be wound on the cloth beam and at the same time the warp yarn must be released from the warp beam.[16] The modern power loom is indeed a complicated apparatus. It has grown through the centuries from its wooden frame to what now resembles an iron monster. A monster indeed, in a world of industrial progress.

[15]McGowan, E. B., *Textiles and Clothing* (New York: Macmillan Company, 1931), pp. 48-49.

BIBLIOGRAPHY

1. Hooper, Luther, *Weaving for Beginners* (London: Pitman & Sons, 1920).
2. Hooper, Luther, *Hand Loom Weaving* (New York: Pitman & Sons Publishing Co., 1948).
3. *Ciba Review*, "The Loom," Society of Chemical Industry in Basle, Switzerland, Dec. 1938, No. 16.
4. Barlow, Alfred, *History and Principles of Weaving* (London: Gilbert and Rivington Printers, 1879).
5. Woolman, M. S., and McGowan, E. A., *Textiles* (New York: Macmillan Company, 1926).
6. Faulkner, H. U., *American Economic History* (New York: Harper & Bros., Publishers, 1949).
7. *Ciba Review*, "The Mechanization of the Loom," Society of Chemical Industry in Basle, Switzerland, Dec., 1938.
8. *Encyclopaedia Britannica*, 14th ed., No. 23.
9. McGowan, E. B., *Textiles and Clothing* (New York: Macmillan Company, 1931).
10. Potter, M. D., *Fiber to Fabric*, Gregg Publishing Company, New York, 1945.

[16]Potter, M. D., *Fiber to Fabric*, Gregg Publishing Company, 1945, pp. 57-59.

The United States, with about six per cent of the world's population, has 78 per cent of the world's automobiles and 51.6 per cent of its trucks and buses. Plentiful and economical supplies of oil which America's privately managed oil industry makes available to fuel these motor vehicles, helps make this possible.—*Petroleum Newsnotes.*

Survey results show that transport companies operating buses on liquefied petroleum gas drove them to a new high of 60,537,447 total miles last year. By the end of 1954, it is expected that more than 2000 buses will be using LP-Gas as a fuel.—*Petroleum Newsnotes.*

PROJECTION BOX

WALTER WILSON

Head, Industrial Arts Department
Vaughn Road Collegiate Institute
Toronto, Ont., Canada

Purpose: A projection box is a teaching aid or device to show film strips, slides, or movies to one individual student, or to a small group of students. In our shop we are faced with the problem of using the film projector in a bright room without the aid of blackout curtains. The projection box described herewith is one answer to the problem. With it we can show films in daylight without darkening the room. As a result the projector is used more often. Its resemblance to TV has a student interest factor which should not be overlooked.

How to use: It can be set up in the planning center of the shop and used as a teaching aid in any number of situations. An individual may need help in lettering the letter *S*, then one slide or frame in a film strip may be shown which will help him solve his problem. Perhaps the metal lathe group need help to understand what is behind the apron on the lathe carriage. A section of a film strip on lathe operation[1] should explain the mysteries of automatic feed.

Plan for using: We plan to use the projection box to show safe procedure in the use of hand tools[2] and machines. By using such films as the Ford Industrial Arts Award film strips[3] individual students or groups could use the projection box and gain ideas for projects. The projection box is not designed to take the place of teaching but to give visual assistance to explain a difficult point.

[1] "The Metal Working Lathe." Jam Handy Organization, 2821 E. Grand Blvd., Detroit, Mich.
[2] "Safety in the Woodshop." United States Steel Corp. 436 Seventh Ave., Pittsburgh 30, Pa.
[3] "1952 Industrial Arts Awards Film Strip." Ford Motor Co., 3000 Schaefer Rd., Dearborn, Mich.

LIST OF MATERIALS

No. Req'd.	*Name*	*Material*	*Size*
1	Screen	DD. ground glass	10⅛ x 10⅞ in.

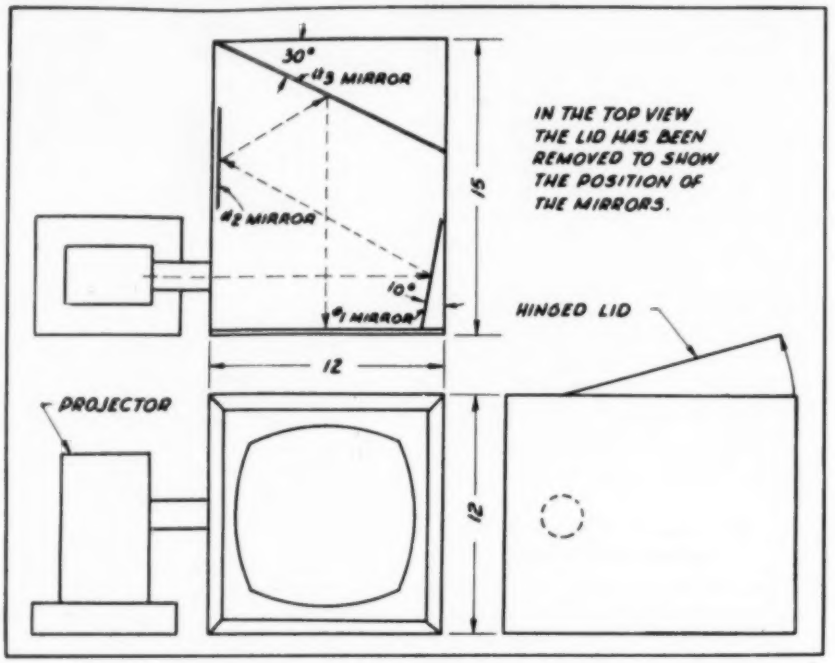


Fig. 1. Projection box

No. Req'd.	*Name*	*Material*	*Size*
1	Mirror No. 1	Plate mirror	6 x 10 in.
1	Mirror No. 2	Plate mirror	8 x 10 in.
1	Mirror No. 3	Plate mirror	10 x 10 in.
2	Sides	Fir ply	⅝ x 12 x 15 in.
2	Top and bottom	Fir ply	¾ x 11 x 15 in.
1	Back	Fir ply	¾ x 11 x 10½ in.
1	Screen border	Black Masonite	12 x 12 in.
4	Screen frames	Basswood beveled 15 deg.	¾ x 1 x 12 in.

Construction

Box

1. Regular box construction.
2. Hinged lid allows you to adjust the mirrors.
3. The front screen may be designed to look like a TV tube.
4. Paint the inside of the box a flat black.

Screen

1. Hand grind double diamond glass. Aluminum oxide abrasive cloth No. 100, or emery cloth No. 0 does a good job of grinding glass. Use it dry. Sandblasted glass gives a clear picture.
2. An acid etched glass also gives good results.

Mirrors

1. Plate glass *silvered on the face* gives the best picture without distortion.
2. The reason for the *three* mirrors is to increase the distance the light travels and therefore increase the image.
3. The angle at which to position the mirrors can be arrived at by trial and error. A wooden base can be made to hold the mirrors upright. Cut a slot in each block to hold each mirror.

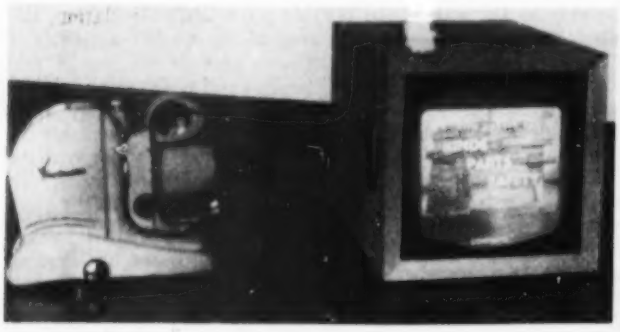


Fig. 2. The projection box in operation

Fig. 3. Storage for teaching aids →

REFEPENCES

Weaver, G. G., and Bollinger, E. W., *Visual Aids* (Toronto: Van Nostrand Co., 1949), p. 325.

Slide Projection Device (College Park, Md.: Industrial Education Dept., University of Maryland).

LAMP AND SHADE WITH TAPPED COPPER PANELS

HARRY S. BROWN, JR.

Crafts Instructor, Oakleigh School
Grand Rapids, Mich.

KENNETH THOMPSON

Seventh Grade Student

This art metal adorned lamp has proved to be a popular project in junior high classes where the work is limited largely to hand tools. However, it should prove to be a test of skillful use of power tools in senior high school classes.

If several lamps are being made, individuality may be had by variations such as these: The base may be single or double, and may be, or not be, chamfered. The top cap may also vary in proportion to the column. The column may be of differing heights, and may be adorned with one, two, three, or four metal tappings. The base, cap, and column need not be square.

The remainder of the article will concern the problems of the particular lamp in the photograph.

The Double Base

The double bases (*a* and *b*) with the chamfered edges is a test of skill in that it shows how well the student can work to precise dimensions. A small difference in the dimensions of the chamfers, or in the centering of the bases and column, will be readily noticed.

The reason for the ¾-in. hole being drilled in the bottom base *a*, was so that a knot could be tied in the cord at this point to prevent light failure through loosened wires at the socket if someone were to trip over the cord.

The ¼-in. hole to be drilled from one edge of the bottom base to the center, is more easily drilled if the drilling is done across the grain rather than with the grain.

A ¼-in. hole in the upper base *b* is plenty large enough for the cord.

The chamfers on both bases and on the cap should be the same size.

The Column

If four tappings are to be used, softwood should be used for the column so that the driving of the escutcheon pins will be easy. If one or more sides of the column are not to be covered, the wood should match that of the rest of the lamp.

The squaring of the ends of the column will be easier if it is done after the column is assembled. This means that the individual pieces will have to be cut about half an inch longer than the finished dimension.

The four pieces for the column, *c* and *d*, were fastened with 6*d* finishing nails. The nails were set with a nail set so that none of the heads would protrude far enough to dent the copper later on.

Assembling the Bases and Column

There are two ways of assembling the lamp. One method is to attach the upper base *b* to the column, and then attach the bottom base *a* to the upper one. The method which was used was to fasten the two bases together, and then attach them to the column.

The accurate locating of the screw holes was done by placing the column on the underside of the large base (*a*), centering

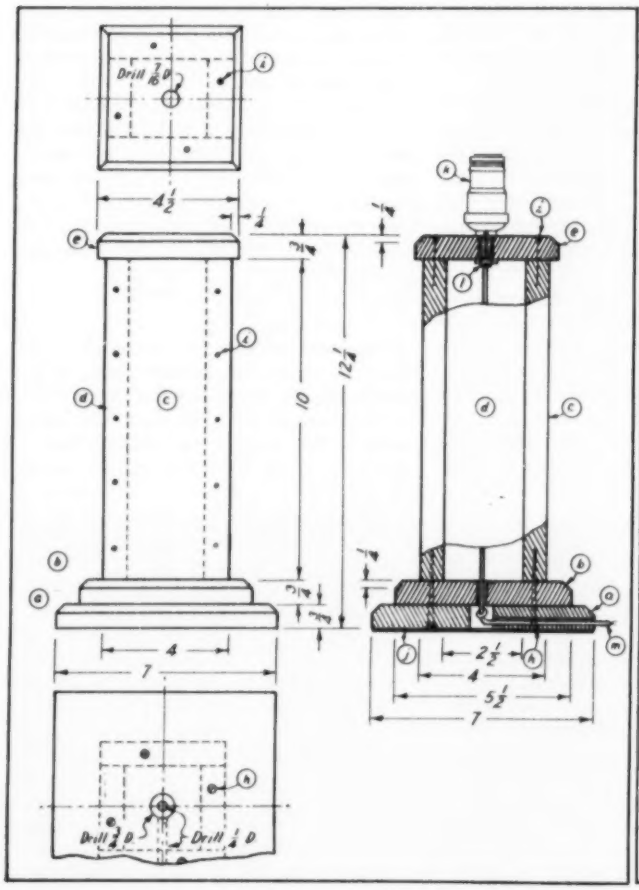
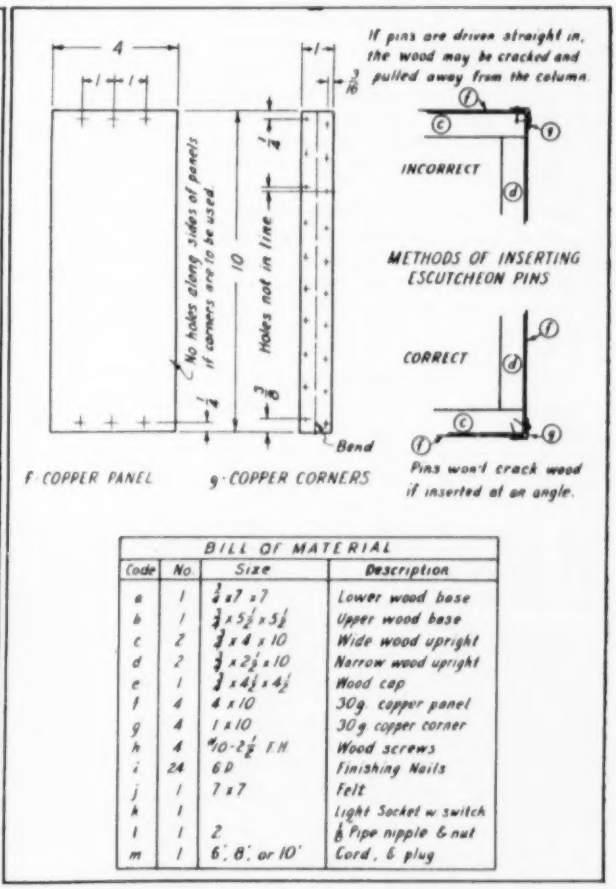


Fig. 1. Details of shade and lamp



BILL OF MATERIAL

Code	No.	Size	Description
a	1	¾ x 7 x 7	Lower wood base
b	1	¾ x 5½ x 5½	Upper wood base
c	2	¾ x 4 x 10	Wide wood upright
d	2	¾ x 2½ x 10	Narrow wood upright
e	1	¾ x 4½ x 4½	Wood cap
f	4	4 x 10	30g. copper panel
g	4	1 x 10	30g copper corner
h	4	#10-2½ F.H	Wood screws
i	24	6D	Finishing Nails
j	1	7 x 7	Felt
k	1		Light Socket w switch
l	1	2	⅛ Pipe nipple & nut
m	1	6', 8', or 10'	Cord, & plug

Fig. 2. Details of copper panel and corners

it, and drawing a pencil line around it. The holes were arranged so that they were not in the exact center of each side of the column, and also were not in the corners. The reason for this was so that the danger of having the escutcheon pins strike the screws was avoided. The four holes were drilled and countersunk for the No. 10 by 2½-in. f.h. wood screws.

Then the upper base *b* was centered on the top face of the bottom base, and clamped securely so that it wouldn't slip. Care was taken to have the grain running in the same direction in both bases and in the cap. Pilot holes were drilled in the upper base, for the 1½-in. screws, by inserting the drill through two opposite holes in the bottom base. The No. 10 by 1½-in. f.h. wood screws were temporarily inserted into the holes to hold the two bases together. Then the other two holes were drilled in the upper base to correspond with the two empty holes in the lower base. These were to be the continuation of the shank holes for the longer screws.

The column was placed on the upper face of the upper base, centered, and a light pencil line was drawn around it. The column was then placed in a vise with the bases turned upside down on it. The bases were centered over the column by means of the pencil marks. Then 2½-in. screws were inserted in the two holes, and were tapped with a hammer to mark the location for the drilling of the pilot holes in the column for the screws. The column was drilled for the screws, the centering of the bases and column checked, and the two 2½-in. screws were inserted and tightened.

The two shorter screws were then removed, the holes were drilled for the longer screws, and the other two 2½-in. screws were inserted. A piece of felt (*j*) should be glued to the underside of the base to hide the holes.

The Cap

The cap *e* may be fastened with 6*d* finishing nails, as is suggested in the drawing, or with flat headed screws. If the screws are used, the holes must be counterbored so that they may be plugged later with plugs cut from dowel material. If finishing nails are used, the holes for them should be drilled to prevent the wood from splitting when the nails are driven in or set.

If a nut is to be used on the pipe nipple, a $\frac{7}{16}$-in. diameter hole should be drilled to permit the pipe nipple to be inserted easily. If a short pipe nipple is used, the underside of the cap has to be counterbored for the nut with about a ¾-in. diameter drill. If the nipple is to be turned into the wood, then a $\frac{3}{8}$-in. drill should be used.

The Copper Tappings

The desired finish should be applied to the lamp before the tappings are attached.

Fig. 3. Shade and lamp with tapped copper panels

The tappings should also be antiqued and lacquered beforehand.

The lamp will be of greater interest to observers if four different but related designs are used, rather than one design repeated four times. Kenneth Thompson used four related Holland scenes on the lamp, and a fifth one on the shade.

The procedure for making the tappings will not be explained here. The process can be found in any one of several craft books.

If the corner angle pieces *g* are to be used, holes should not be punched along the sides of the copper panels *f*, and only three holes need to be punched along the top and bottom edges of the panels. The copper is soft enough so that the escutcheon pins will pierce it easily as the corner pieces are attached.

There is a correct and incorrect method of inserting the escutcheon pins. The pins should be inserted at an angle so there is less tendency for the wood to split. This is true even if the tappings are mounted without the corner pieces.

The escutcheon pins bend over quite easily, and when they do so they are likely to tear a long hole in the copper, or to dent it. For this reason care must be taken not to let them strike hard things such as screws, finishing nails, other escutcheon pins, and even knots in the wood. Therefore it is advisable to place the holes on the two sides of the corner pieces in an offset position so the pins won't strike each other as they are driven in.

Two people will probably have to work together in attaching the copper panels and corners to the lamp. One person can hold the copper in place with one hand, and the escutcheon pin in a bobby pin with the other hand, while the second person gets the escutcheon pin started with a hammer and nail set. If he attempts to drive the escutcheon pins in without the use of the nail set, when attaching the panels, he is likely to strike the base or the cap of the lamp with the hammer.

The escutcheon pins should be inserted in both sides of the corner pieces together to insure proper fit. It is best to begin near the middle, and work gradually toward both ends of both sides. If all of the pins are put in one side of the corner piece, the corner will probably be forced away from the lamp column far enough so it will become misshapen when the pins are driven into the other side.

The bobby pin should be removed from the escutcheon pin after the first firm tap with the hammer, so that it is not driven against the copper. Only a couple of dents made by the prongs or loop of the bobby pin are needed to ruin the appearance of an otherwise excellently executed tapping.

The Lamp Shade

A rectangular metal shade frame was purchased from an electrical company, and was wrapped with binder twine. Raffia could be used in place of the binder twine.

It is necessary to wrap the upright pieces with twine before the shade frame is wrapped, or the twine will separate enough at the corners to expose the bare pieces.

The opening on the front side of the shade should be about 1 inch narrower than the width of the copper, so there won't be an opening to produce an undesirable slit of light on each side of the copper.

The tapping was a little heavier on the shade panel so that the copper was pierced, enabling the design to be outlined in light when the lamp is burning.

Rivets can be used to fasten the copper panel to the shade, but they are not necessary. If the copper is cut about 2 inches longer than the height of the shade, each end can be folded around the shade frame to hold the panel in place. Care must be taken not to fold the ends too tightly or the panel will be pulled out of shape where the twine winding stops.

SCALE MODEL OF A PLANNED HOME

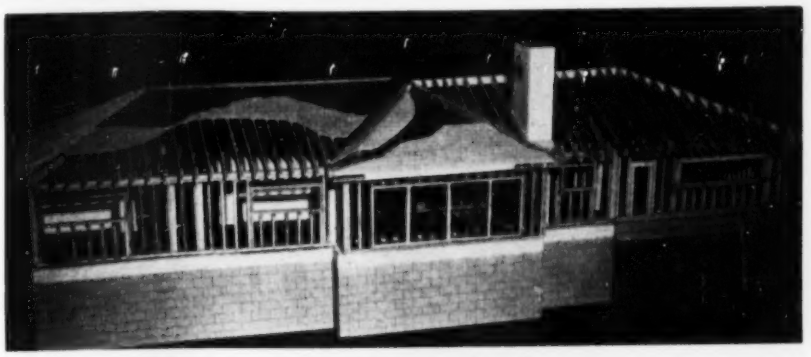
ANDREW P. GRABOWSKI

Buffalo, N. Y.

Formerly Instructor of Mechanical Drawing and General Wood Shop

High School

Los Alamos, N. Mex.



Interior partitioning and roofing

There is no greater satisfaction than to be able to create an idea — then with all the skill at your disposal, give it substance and form. To be able to successfully construct such an idea will usually require knowledge of design, construction techniques, safe and skillful shop practice.

This desire to build was typical of a group of senior high school students who believed that as a climax to their architectural drawing course, a scaled model home could be constructed if all the students would be willing to pool their abilities, knowledge, and time.

The beginning steps of this group project began with the students preparing sketches and drawings of what they felt would be an ideal home to construct, with the main objective of the project not being in the completed model but rather in the knowledge gained from the actual construction problems which would be involved.

The unanimous choice of the group was a one story ranch style home, with a built-in one car garage, of good design and with western frame construction. The model would be built as one unit but subdivided into two main sections with the foundation, floor framing and partitioning as one section and the entire side and roof framing as the other, thus making the top removable.

Each student was given a portion of the plans and construction which he would undertake as his main contribution to the completion of the model. His responsibility would include drawings of the necessary details for construction purposes, as well as to act as foreman of the project when building of his section was to take place. In this way, the entire group would work on all sections of the model at all times and would participate in the construction from the foundation to the final sheathing.

The construction was divided into six parts: (1) foundation and floor framing, (2) exterior framing, (3) roof framing, (4) interior partitioning, (5) exterior sectional sheathing, (6) interior sectional sheathing and detailing. A scale of ¾ in. = 1 ft. was used in making the drawings of every section of the model. Construction did not begin until all the required drawings were checked and double-checked so that all errors were corrected.

With only two of the students having previous general woodshop experience, it became necessary to take time from class to give instruction on the use of woodshop machinery. Jigs and fixtures were devised so that all the material to be cut was safely handled while being trimmed to the scaled dimensions.

Scrap pieces and short stock soft pine were used for the entire structure. One-half-inch stock was chosen for the foundation. The studs, joists, and rafters were cut from $^{13}/_{16}$-in. material. The majority of the miniature lumber was cut to size at one time. The foundation walls were laid out in a manner similar to the plan used of laying out a foundation on a lot. The members were glued and nailed together after being cut to exact measurements according to the drawing.

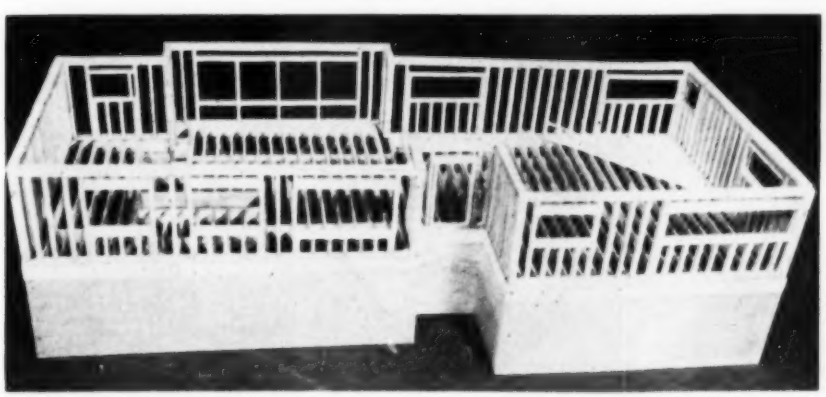
While the student in charge of this section of construction was assembling the foundation walls, others in the group were cutting the joists to size. A piece of ¼ by ¼-in. steel stock was used as the main joist support.

After the box sill was constructed, the joists were ready to be set in place. The next student then was preparing his studding material for the frame which was to be built in sections. The drawings were used as a pattern as the walls were constructed. As the side frame sections were being assembled, two thirds of the floor joists were being covered with thin sheets of poster cardboard to resemble subflooring. Black construction paper was fastened in place as the floor insulating material followed by thin strips of oak veneer to show the finished flooring.

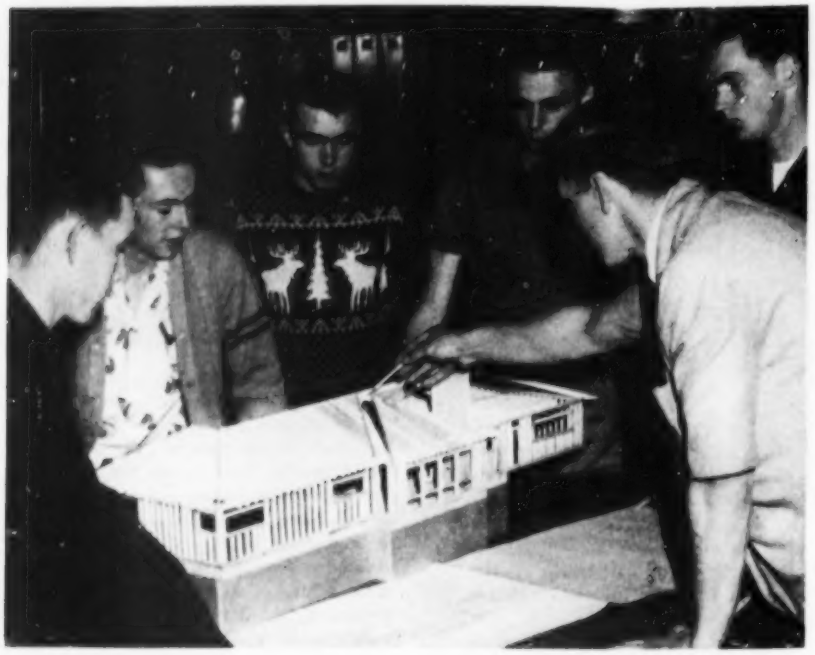
The foundation and basement being completed at this stage, a thin sheet of cardboard, the width of a scaled 2 by 4, was cemented around the outer edge of the first floor. This was done so that the wall framing would be separated from the finished floor for removal when the model was completed. All the wall sections were laid on this stripping. Braces were used to stiffen the walls and to keep the corners square while the wall sections were being fastened together.

When the exterior wall framing was complete, it was removed from the foundation structure. The partitions were then made and permanently fastened to the finished floor. As this was being done, the roof joists were being fastened to the now removed wall framing. A chimney of heavy solid stock was made to act as a guide for placing the framed walls onto the floor frame after the roof joists were set in place.

The next step, which proved to be the most difficult for the group, was the roof



Foundation, floor framing, and exterior framing



Attaching garage to the structure and exterior finishing

framing. The ridge board, being located off center, the many hip and valley rafters involved in the framing, confronted the students with the task of cutting numerous individual jack rafters, much more than is found in ordinary construction. The small number of common rafters were installed first to give support to the roof framing while the jack rafters were being cut.

After the roof framing was being completed, the garage was added to the structure. The last step involved the framing of the top of the garage to the rest of the roof frame.

With the framing completed, the task of exterior finishing advanced rapidly. Thin posterboard was cut to size to resemble clap boards and insulating material. Sheets of celluloid were cut and cemented into the window openings. Thin $\frac{1}{16}$-in. balsa was cut for the roof sheathing and cornices — copper foil was used for flashing — and thin balsa stock was cut for shingles. The foundation walls were inked to resemble cement blocks.

The project required 14 weeks to complete. Work was limited to class time of 55 minutes per day but shortly after the construction began, the interest was so great that all the students were making their own arrangements to use some of their study hall periods to help speed the work. In some instances, the students came after school where a particular job was to be done on the model.

Arrangements were made with the school administrative staff, to have a special section of the main lobby to display the model. The drawings that were used as well as pictures of the model in the various stages of progress, were also part of the exhibit. The students were available between classes and during free periods of the day to answer questions of the student body and of the school's faculty concerning the model home.

This completed structure gave the students (1) a realization that architectural drawing is one of the fine arts requiring study beyond that given in the elementary courses of the high school, (2) it provided for unlimited creative expression and originality, (3) an opportunity to appreciate the need of good working drawings, (4) a chance to better visualize the necessity of fundamental principles of construction techniques, (5) an introduction to a wide variety of materials, tools, and shop equipment.

Photographs by: John Payne, Charles A. Lehman.

AN IMPROVED METHOD OF EXPLAINING TRIANGULATION

JOHN S. KREMPA
Instructor of Industrial Arts
Draper High School
Schenectady, N. Y.

Development drawing is one important phase in the Mechanical Drafting Course II at Draper High School. The most common developments like prisms, pyramids, cylinders, and regular cones are presented. Most of the students do not have much difficulty with these developments. However, when developments of oblique cones and their deviations are explained, some students have difficulty in visualizing the system of triangulation, which is necessary for determining true distances.

During the past few years we have tried a number of different methods of presentation. This year we devised a method completely different from the others. The core of this method lies in the use of a model, constructed out of celluloid triangles. Such a model, when properly assembled, presents a very realistic picture of the oblique cone shown in Figures 1 and 2. The picture is formed by the edges of each individual triangle; these simulate the construction lines in the development. The unique point about this model is that it is composed of 24 individual celluloid triangles, any one of which may be removed from its position in the model, to demonstrate triangulation and layout for true distances. See Figure 3. In order to have a better sequence of learning, a complete development drawing of the same size oblique cone is at hand. This enables the student to remove celluloid triangle and compare it to the "true" triangle on the accompanying drawing. Figure 4 illustrates effect of celluloid triangles *X* as compared to the triangulation *Y* of the drawing. It can easily be seen now that the system of triangulation actually finds the true length of each line of the oblique cone from the respective base point to the vertex.

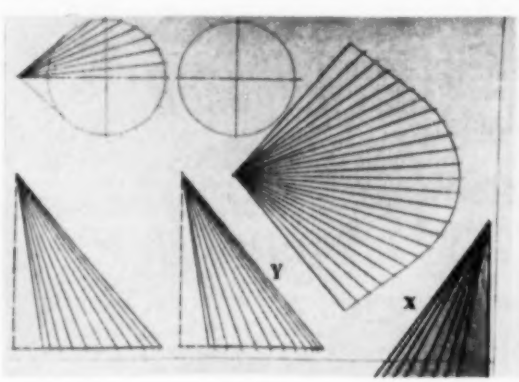


Fig. 4

Fig. 2

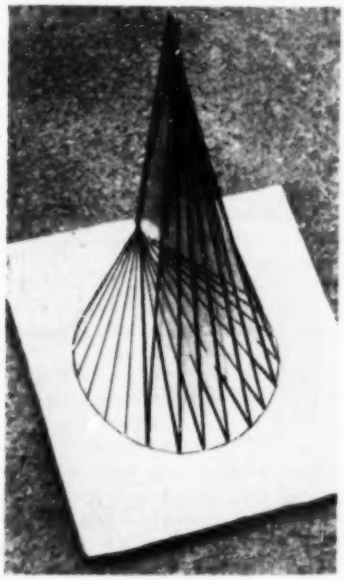


Fig. 1

In using this device, I have noticed a great improvement not only in the understanding of the triangulation method, but a noticeable increase in speed of comprehension. To date this system surpasses by far the other methods I have used, i.e., glass, strings, etc.

Construction of Model

To construct the model:

1. Complete a development drawing of an oblique cone to a desired scale. Recommend 7 in. high and 3 in. diameter at the base.

2. Construct exactly the triangles formed by triangulation. NOTE: Divide base circle into 24 equal parts.

3. Use a pin or needle and trace triangles on celluloid. Number them. Use celluloid 1/32 in. thick.

4. Fold over at scratched line and celluloid will break evenly.

5. Use a piece of 1/4-in. plywood 6 in. square. On it draw the necessary top view.

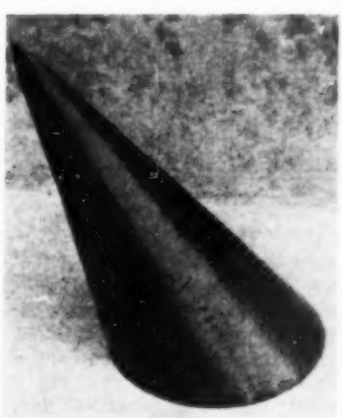


Fig. 3

6. With an X-acto knife cut all necessary slots 1/16 in. deep.

7. From a piece of 18-ga. aluminum, cut out a strip 1/2 in. wide and 7 1/2 in. long. Fold in half, lengthwise. This is used to collect altitude edge of all triangles and secure them with rigidity.

8. Nothing is glued. Entire model may be disassembled easily. Assembling all 24 triangles requires about 10 minutes. As a rule, it is not necessary to remove all triangles at one time.

LOCATING SCREW HOLES FOR HINGES

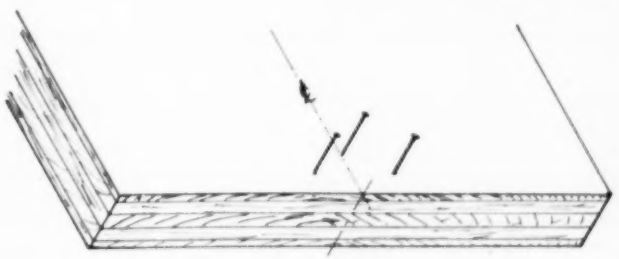
RAY C. DOANE
Industrial Arts
Resource Teacher
St. Paul Public Schools
St. Paul, Minn.

The process of locating screw holes for a number of hinges may be very time consuming. A device to save time while duplicating layouts is essential.

A suggested technique is implied in the use of the *punch* template described in the drawing. Cabinet door hinges are often placed equidistant from the ends of the door. The first step in preparing the punch template is to determine the distance from the end of the door to the center of the hinge. Cut a piece of 1/2- or 3/4-in. plywood twice this distance for the length and approximately 3 inches wide. Locate the center line as shown on the drawing. Lay out the holes for one hinge — very carefully. Drive coated nails as vertically as possible. Allow the nails to protrude the opposite surface nearly 1/16 in. Check the position of the nail points with the center of the holes in the hinges.

Plywood is recommended to eliminate splitting tendencies. Coated nails will remain positioned in the plywood.

Align the proper edge and end of the punch template flush with the edge and end of the cabinet door. Be certain the template is flush at both the edge and end. Press the template to the cabinet door. The nail points will puncture the surface of the door indicating the position of screw holes. This template may be used for top and bottom hinges for right and left hand doors.

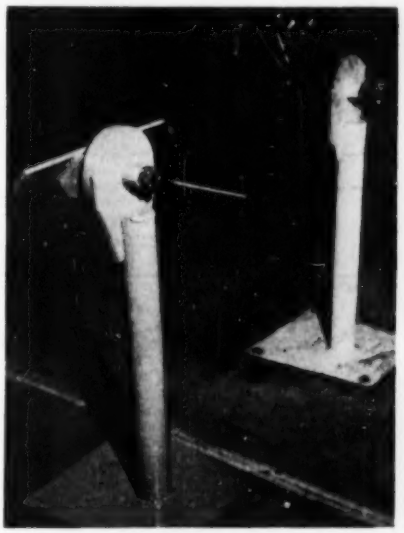


The punch template

FORD V-8 ENGINE STAND

HENRY F. KLEEMEYER
Vocational Shop Instructor
Sequoia Union High School
Redwood City, Calif.

The motor stand for Ford V-8 motors illustrated and described herewith has been constructed in our shop, and we have found it most satisfactory in our auto-mechanics shop.



Ford V-8 engine stand

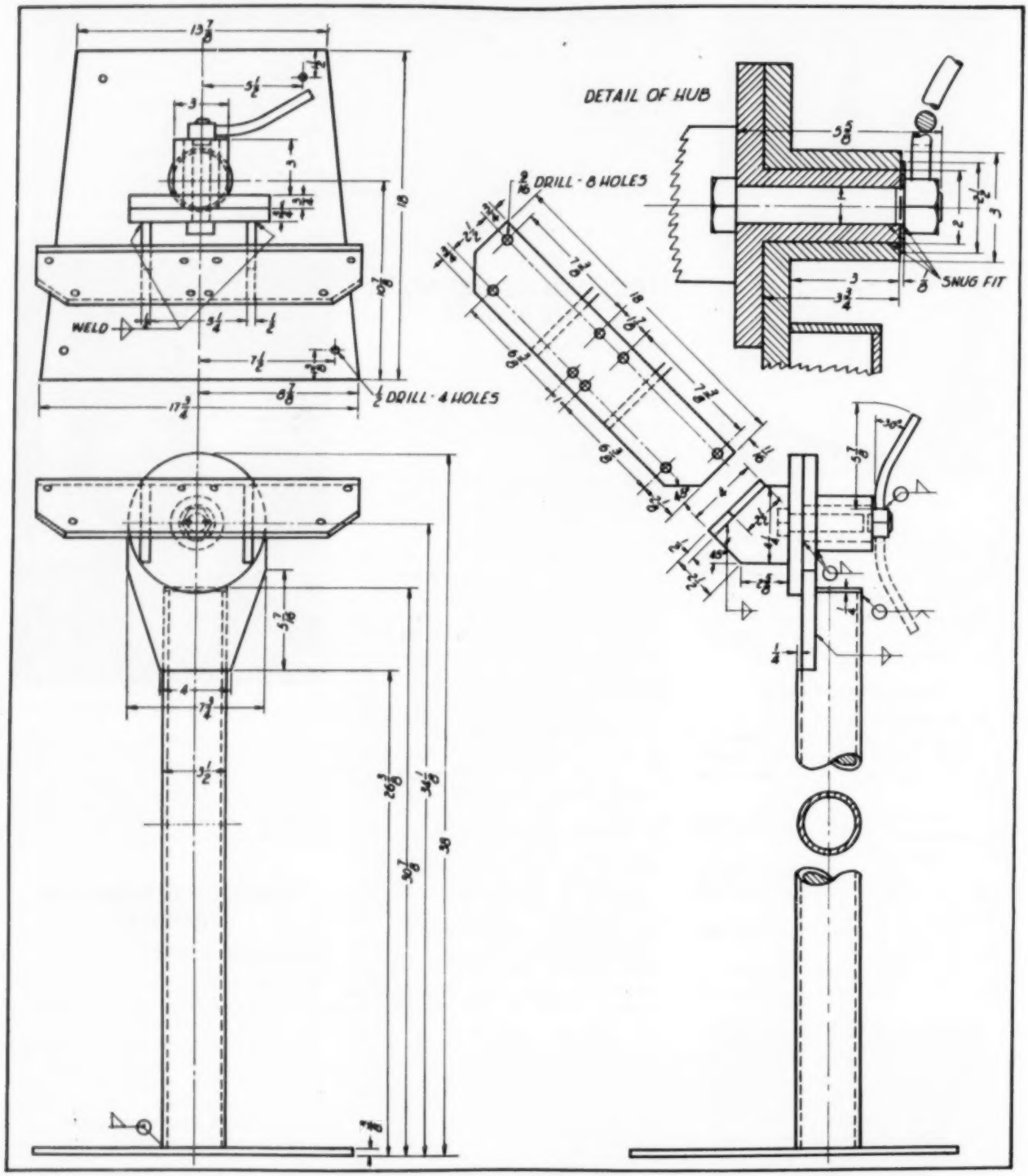
The cost is approximately ten dollars each and they compare favorably to those costing several times as much. The job involves layout, cutting, drilling, welding, threading, and turning. Material is all mild steel. See details on next page.

PROJECT DESIGN FOR TEACHERS

ALEXANDER F. BICK
Milwaukee, Wis.

(Continued from page 289 of the October, 1954, issue)

Schools do not ordinarily associate machine and welding shops with creative art, nor do they think of drafting as a possibility in the teaching of creative design, yet, creative thinking is a frequently men-



Details of the Ford V-8 engine stand

tioned objective in education. Long ago, the woodshops changed from exercise work to creative project work, and even though the creative aspect is often sacrificed to copy work, the advance added an effective element of freedom to the woodshop potential. It is therefore the more difficult to justify the perennial exercises in most machine and welding shops and in the drafting courses.

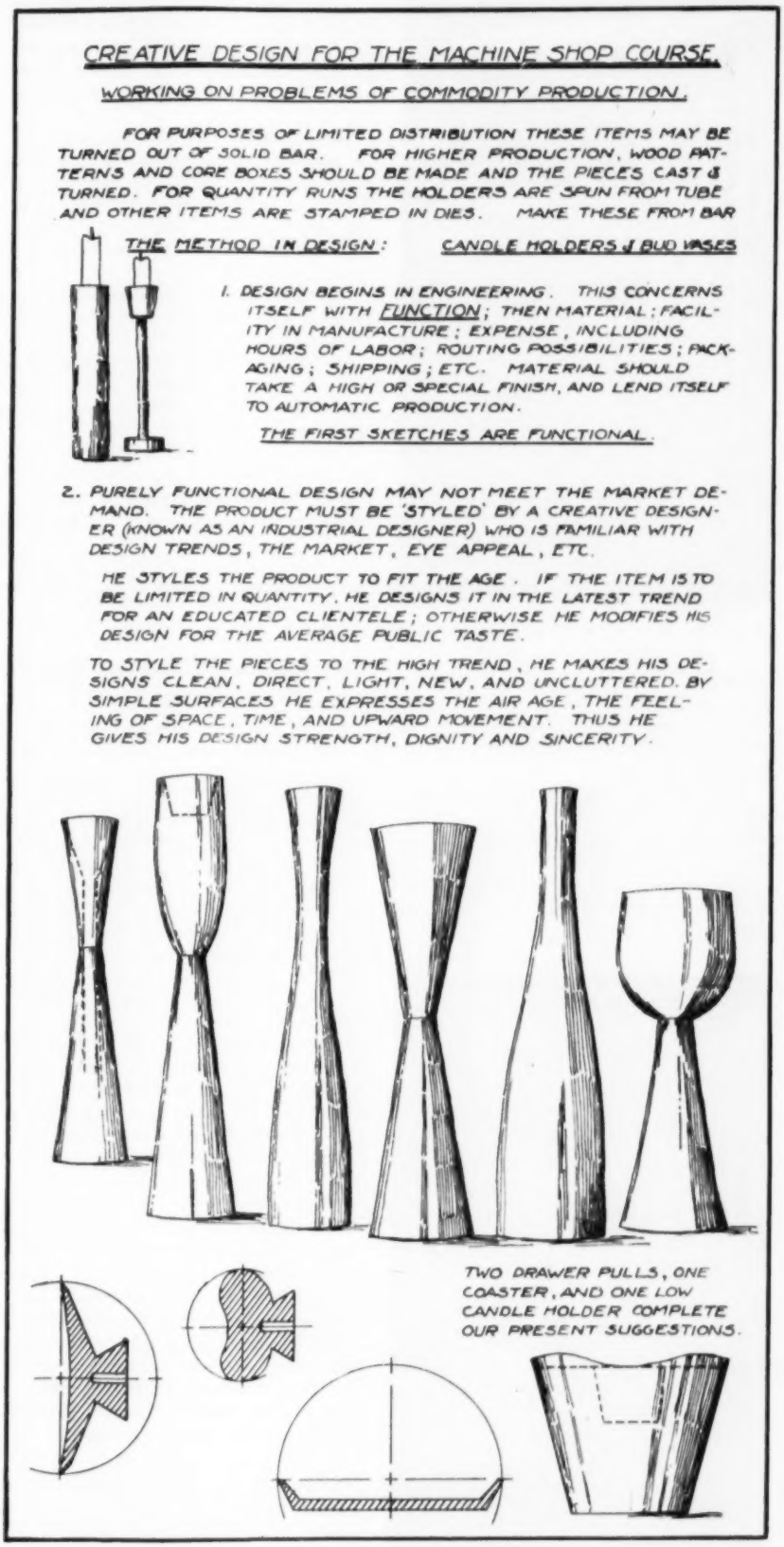
On the other hand, looking realistically at the over-all need of the students in these courses, as we see it in industries, perhaps the first thing these boys do in a plant is machining a commodity. Even though many operations are remote from the final assembly, the part has meaning and use. When we look at industry then, we realize that a good part of machine work, at least a part of welding, and a major part of drafting concerns itself directly with manufacture. When broken down, this means product engineering, creative designing, tooling, and machining, and then assembly.

The school effort thus disregards an important facet of the total picture, and it would help greatly were some of the static work in old courses replaced with the development by the machine of some small product of industry; that is, were some of the time given to the production of a salable commodity. The students would benefit no end. They could, for example, then understand the difficult problems of production engineering, of the market demand, and of the challenge of competitive distribution. This would surely open avenues of realistic thinking, and fair attitudes might be built that should profit the community.

The problems of commodity production differ sharply from those of the tool room and of plant maintenance, and while the latter are relatively important, if the schools limit their shop courses to these fields, the boy misses much that he could learn of the greater production fields which are of value whether he eventually works in production or not. Furthermore, the suggested enrichment of machine-shop courses brings in many new techniques which are otherwise lost.

The projects shown in this article are a few lathe items on which there are a variety of standard setup and tool problems together with new ones. The materials may be steel, brass, aluminum, or other metals. The projects also may be either candleholders or bud vases. Creative problems may as easily be set up for the shaper, or in fact for any of the machines, but it is hoped that if these things are done, that none of the designs are allowed to recede into the dark periods, when today, industry as a whole, and especially our large industries, employ top bracket industrial design consultants and produce commodities at the very peak of the contemporary trend. Their products *are* the trend.

The illustrations outline a system of design, beginning with the engineering phase where the idea is formed to its efficient use and economical manufacturing facility, and ending in the art phase where the form is modified to fit the air age. This is the sum and substance of commodity design.


CREATIVE DESIGN FOR THE MACHINE SHOP COURSE.
WORKING ON PROBLEMS OF COMMODITY PRODUCTION.
FOR PURPOSES OF LIMITED DISTRIBUTION THESE ITEMS MAY BE TURNED OUT OF SOLID BAR. FOR HIGHER PRODUCTION, WOOD PATTERNS AND CORE BOXES SHOULD BE MADE AND THE PIECES CAST & TURNED. FOR QUANTITY RUNS THE HOLDERS ARE SPUN FROM TUBE AND OTHER ITEMS ARE STAMPED IN DIES. MAKE THESE FROM BAR
THE METHOD IN DESIGN:
CANDLE HOLDERS & BUD VASES
1. DESIGN BEGINS IN ENGINEERING. THIS CONCERNS ITSELF WITH FUNCTION; THEN MATERIAL; FACILITY IN MANUFACTURE; EXPENSE, INCLUDING HOURS OF LABOR; ROUTING POSSIBILITIES; PACKAGING; SHIPPING; ETC. MATERIAL SHOULD TAKE A HIGH OR SPECIAL FINISH, AND LEND ITSELF TO AUTOMATIC PRODUCTION.
THE FIRST SKETCHES ARE FUNCTIONAL.
2. PURELY FUNCTIONAL DESIGN MAY NOT MEET THE MARKET DEMAND. THE PRODUCT MUST BE 'STYLED' BY A CREATIVE DESIGNER (KNOWN AS AN INDUSTRIAL DESIGNER) WHO IS FAMILIAR WITH DESIGN TRENDS, THE MARKET, EYE APPEAL, ETC.
HE STYLES THE PRODUCT TO FIT THE AGE. IF THE ITEM IS TO BE LIMITED IN QUANTITY, HE DESIGNS IT IN THE LATEST TREND FOR AN EDUCATED CLIENTELE; OTHERWISE HE MODIFIES HIS DESIGN FOR THE AVERAGE PUBLIC TASTE.
TO STYLE THE PIECES TO THE HIGH TREND, HE MAKES HIS DESIGNS CLEAN, DIRECT, LIGHT, NEW, AND UNCLUTTERED. BY SIMPLE SURFACES HE EXPRESSES THE AIR AGE, THE FEELING OF SPACE, TIME, AND UPWARD MOVEMENT. THUS HE GIVES HIS DESIGN STRENGTH, DIGNITY AND SINCERITY.
TWO DRAWER PULLS, ONE COASTER, AND ONE LOW CANDLE HOLDER COMPLETE OUR PRESENT SUGGESTIONS.

Design projects for the machine shop

READING DESK

R. W. KING

Kettering Road County Secondary School

Northampton, England

The photographs on page 320 show two views of a reading desk made recently at the Kettering Road County Secondary School. It is made in Japanese and English oak, and is used for the reading of lessons and announcements at the morning assembly of the whole school.

The class of 18 boys who made it belong to 4B2 — that is, fourth year boys of 14 to 15 years of age. The fourth year classes

Fig. 1. Rear view of reading desk

consist of 4 classes of approximately 40 boys in each class graded into 4A, 4B1, 4B2, 4C. Each class is divided in half doing woodwork and metalwork for a six-month period in each year.

Each boy had a panel of Japanese oak ¾ by 8 by 10 in., and a full-size drawing which had been prepared by boys of 4A, under the direction of the art master.

The carvings were completed by the individual boy, using gouges made from old square files.

Fig. 2. Front view of reading desk

The 12 best panels were selected for the desk and represent various school activities. The following are shown: science, art, gardening, drama, football, singing, geography, history, handwork, reading, cricket, and writing.

The framework is of 1 by 2-in. oak stiles and middle rails, with 4-in. top rail and 3-in. bottom rails. The frame being tongued into the corner posts which are of 2 by 2-in. oak, double tenoned into the 4 by 3-in. feet. The posts are heavily chamfered and double chamfered.

The hinges and latch are handmade from 16 mild steel, and the nails made from 5/16-in. square mild steel.

All joints in the desk are pegged with ¼-in. dowels, and finished surfaces are planed, and scraped only, no sandpaper being allowed.

The finish is fumed oak, waxed. The fuming is carried out by building a tent around the desk, and placing a number of dishes containing ammonia around the desk.

A brass plate is fixed inside the door giving the names of all boys connected with the job.

OIL FIELDS WEAR HALOS— OF RADIOACTIVITY

Using a radiation detector called a scintillation counter, scientists have discovered atomic "halos" of radioactivity that pinpoint oil pools deep in the earth and can be spotted from a helicopter. If an interesting change in nuclear count pops up on dials of the scintillation counter, the helicopter may go down for closer study. If the scintillometer still verifies an unusual pattern, geophysicists may tramp over the fields for special readings, even digging a trench and sticking the instruments right into the soil. Thousands of readings must be made before oil men feel they know the device's possibilities, but many are experimenting with it to better their chances of oil discovery. It's another progressive example of a progressive industry. — *Petroleum Newsnotes.*

Diesel fuel powers 80 per cent of all railroad transportation service. — *Petroleum Newsnotes.*

The state of Texas has 140,860 oil wells and averages an increase of about 160 wells per week. Total production for the state is 2,610,500 barrels per day, or less than 19 barrels per well average. — *Petroleum Newsnotes.*

Crude oil is almost useless in its original state. Each of the hundreds of useful oil products made from it has to undergo a lot of processing in an oil refinery. — *Petroleum Newsnotes.*

THE BOOKMARK OF THE MONTH

HERBERT L. FOSTER
Instructor of Graphic Arts
Junior High School No. 613
Brooklyn, N. Y.

The following is a graphic arts project which:

1. Will be of great interest to the students.
2. Will give considerable practical experience.
3. Will integrate the activities of two or more departments.

We have used the production of this calender-bookmark as a project for the Junior Benjamin Franklin Society of our school. It also can be used as a project for the *older boys* who don't seem to have much interest in the shop, for the Graphic Arts Club, or for the *production crew.*

The procedure used is as follows. First, the members of the group work with the library teacher, during their library periods, to compile monthly alphabetical lists of events of historical importance. Next, the students bring the lists to the shop where we prune them to a printable size.

Typesetting methods are up to the individual instructor. Four or five club members use composing sticks set at the same pica measure and each sets up several lines of either the "events" or "births." When the type is set, all composing sticks are assembled. The type then is removed and placed into the proper printing sequence.

The boys then pull enough galley proofs so that each may have his own to proofread for errors. In this way, the boys really enjoy the proofreading because they feel that this is their own major project and that their opinions or findings are really accepted and used.

When all mistakes have been corrected, the job is locked up and placed on the press, made ready, and printed by the club members. After printing, the type containing the titles, club and teacher names, is placed in safe keeping and the other type distributed.

We are now in the process of working up a mailing list of the dignitaries to whom we will send our monthly bookmark. This list could include the members of your local board of education, elected town, county, city or state officials, local library, Y's, community organizations, etc.

The addressing of the letters to be mailed can be performed in your shop or by one of the typing or business classes in your school.

Recently, we carried this project one step further when we gave a memento to everyone attending the sixth annual tea of the "600" Schools of New York City. We arranged this by imprinting the name of the occasion with the plateless engraving

IT HAPPENED IN OCTOBER:

- BORN -

John Adams
Chester A. Arthur
Sarah Bernhardt
Eleonora Duse
Dwight D. Eisenhower
John Hay
Rutherford B. Hayes
Jenny Lind
Franz Liszt
Theodore Roosevelt
James Whitcomb Riley
Giuseppe Verdi
Noah Webster

- EVENTS -

Chicago Fire
Columbus Day
Cornwallis Surrendered
Erie Canal Opened
Halloween
Navy Day
Statue of Liberty Unveiled

1954 OCTOBER 1954

SUN	MON	TUE	WED	THU	FRI	SAT
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24/31	25	26	27	28	29	30

IT HAPPENED IN NOVEMBER:

- BORN -

Louisa May Alcott
Daniel Boone
William Cullen Bryant
Samuel L. Clemens
Madame Marie Curie
Robert Fulton
James Garfield
Ignace Jan Paderewski
Franklin Pierce
Auguste Rodin
Robert Louis Stevenson
Zachary Taylor

- EVENTS -

Armistice Day
Election Day
Lincoln's Gettysburg Address
Magellan Reaches Pacific
Prohibition Ended
Suez Canal Opened
Thanksgiving Day

1954 NOVEMBER 1954

SUN	MON	TUE	WED	THU	FRI	SAT
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

or Virkotype method on the bookmark.

The calender font used in the bookmark or one similar to it can be purchased from the American Type Founders, Elizabeth, N. J., or from your local type supplier for less then $5. All other materials and equipment used in the project are standard equipment found in most graphic arts shops.

COMBATING THEFT AND VANDALISM IN SCHOOL PRINT SHOP

DAVID CARL GOLDSTEIN
Instructor, Printing Shop
Alice Deal Junior High School
Washington, D. C.

Into the constant turmoil that comprises every printing instructor's school career must one day come the moment when one of *his boys* will stalk confidentially into the shop. A light smile will caress his young features as he thoughtfully saunters over to your desk and in a most patronizing voice casually remarks, "Sir, I'm opening my own printing shop; going into business, thanks to your excellent training." A sudden pause follows, then, "I was wondering if you . . ."

At this point begin locking up your type cases, hastily seal all your cabinets, closely check your composing sticks, pica gauges, rules, borders, and cuts . . . for the struggle is on.

This youth, and all who bear him likeness, is as determined to have a shop, often at school expense, as you are to keep your shop intact.

Pilfering Type

No other shop division in the industrial arts or vocational education fields must face head on the problem of petty stealing and juvenile destructiveness as must the printing shop.

Printing in most school systems is expressed in terms of hand composition, presswork, and bookbinding. Of these typesetting absorbs the greatest amount of time and attention; similarly it is the type supplies that are the most difficult to control.

Type, because of its newness and innate appeal to most youngsters, is often taken home (in small quantities) in order that mother, dad, and friends may see this novel medium with which they are creating new horizons. As such, we must be farsighted enough to acknowledge it does help to bring parental attention and some publicity to an often overlooked area of general education.

Unfortunately, this mild opening too often swells itself into a student urge to have his own shop. This in itself is admirable were it not that the supplier more often than not is an already depleted school shop. This sort of theft can be satisfactorily dealt with by taking aside the students in question. Explain to them that they are stealing from their own and future classes, an act punishable by civilian courts of their community. Emphasize the contempt society holds for persons guilty of crimes differing little from their own. Conclude that the supplies they seek can be honestly purchased for little money from type suppliers. If the shop instructor, at the very outset will discourage his students from setting up their own shops, whenever it is apparent that the supplies for such a venture will cause his inventory to be ransacked, he will save himself much anguish. Often this problem can thus be easily averted without too much bad feeling having been aroused.

Destructiveness

It is the deliberately destructive lad who snaps type between his fingers, crunches leads and slugs within his palm to *test his strength* while materially illustrating his disregard and disrespect for school property and discipline, pockets complete jobs rather than distribute the type, and then dumps it down a convenient sewer. This is what seriously disturbs the instructors' planning, inventory, and class control.

What can be done with and for this sort of youngster? How can we keep our shop functioning despite this vandalism?

1. Charge every student a predetermined amount of money to cover this yearly waste. This in effect is a lab fee.

2. Charge only those actually caught stealing with the entire amount destroyed during the past semester.

3. Combat stealing with expulsion, and/or police action.

These are obviously unsatisfactory methods which at best will result in a negative response.

I have attempted in my present situation, with encouraging results, to instill a personal regard for the equipment as something belonging to the pupil. When possible I assign every student to a numbered

case to be used only by himself during the ensuing semester. During the period assigned to familiarization with the type case I have each student record the exact number of pieces of each character in his case. Control in this instance is exercised by having a similar count taken at the end of the term. Do not keep more type in the student cases than can be used in any one sample job. Periodic exams which utilize most of the type on hand forcibly illustrate the need for keeping the case not only clean but intact.

An unfulfilled sense of possessiveness and a degree of selfishness pervade the personality of junior-senior high school students. Let us capitalize on these characteristics to teach citizenship and responsibility . . . and incidentally to preserve our shops.

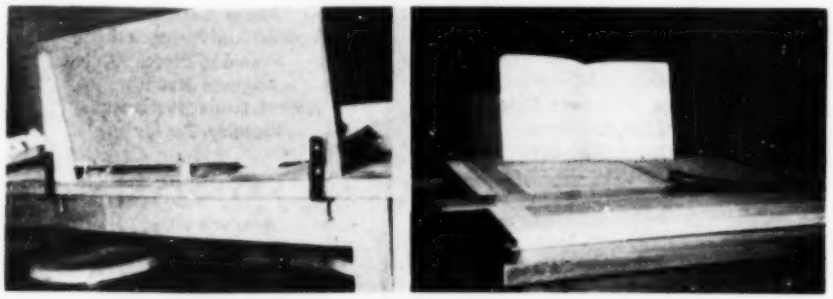
DRAFTING TABLE BOOK REST

ROLAND J. KROGSTAD
CLARENCE SEBRANKE
Roosevelt Junior High School
Fond du Lac, Wis.

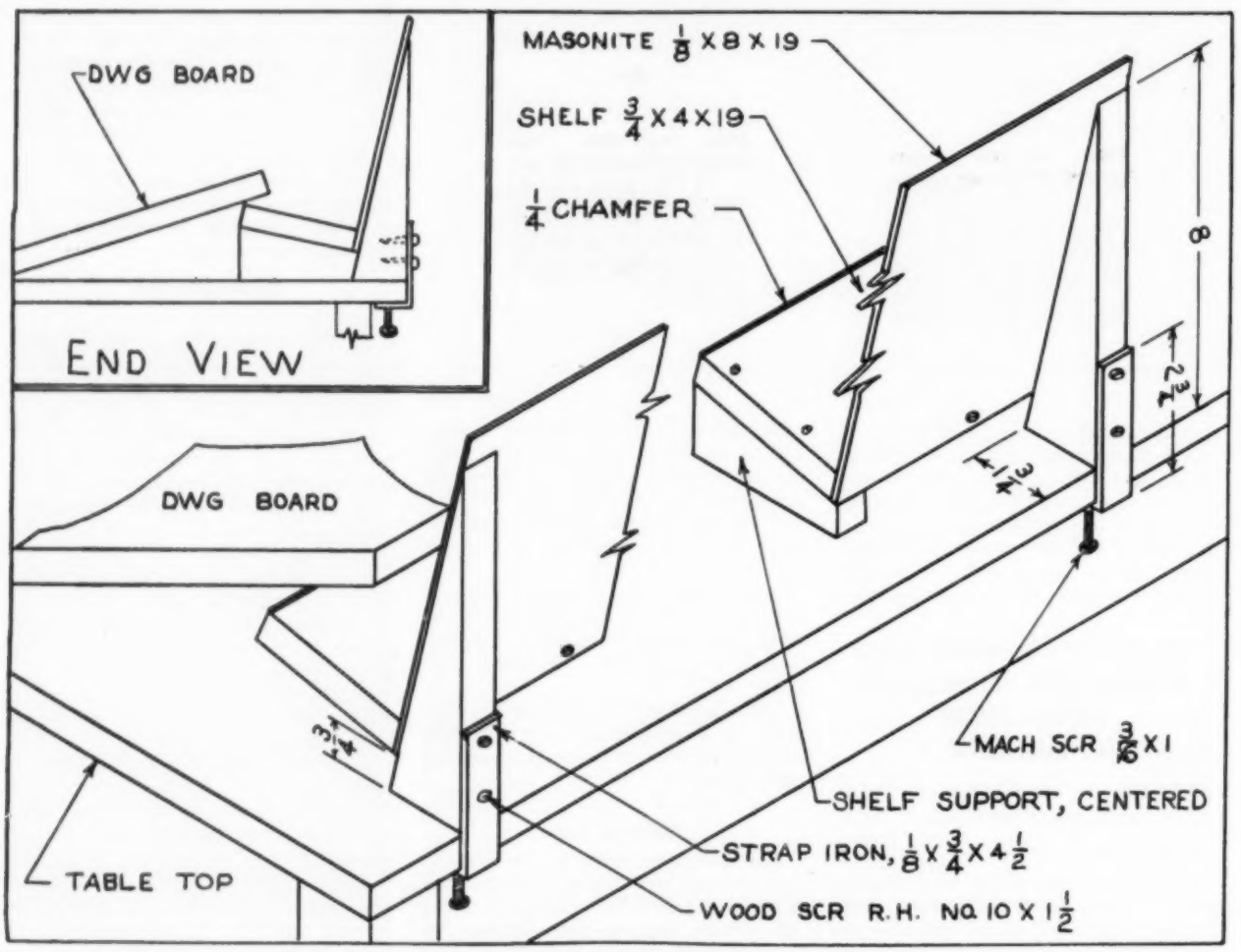
Crowded conditions are not uncommon in present-day classrooms. Because of crowded working space on the drafting tables in our drafting room there was a need for something on which to place books, instruction sheets, etc., from which the students were making drawings. The book rest shown in the accompanying photograph is solving the problem very well. The front edge of the drawing board rests on the shelf holding the book open and in place. The shelf also serves as a convenient storage place for the architectural scales.

Pupil-teacher planning entered into the making of 24 book rests on a production basis in the drafting, woodworking, and metalworking shops. Many suggestions on certain details came from students taking drafting where the real need was apparent. Four students volunteered to make the working drawings to be used in the other two shops.

(Continued on page 22A)

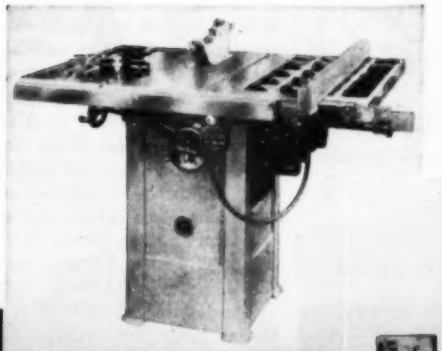


Drawing table book rest

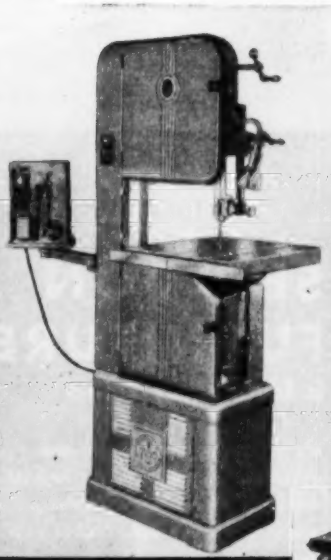


Drawing table book rest

they're "teacher's pets"



LIGHT-HEAVYWEIGHT
10" TILTING ARBOR SAW



LIGHT-HEAVYWEIGHT
Variable Speed
16" BAND SAW

LIGHT-HEAVYWEIGHT
6" JOINTER

Additional LIGHT-HEAVYWEIGHTS to round out your School Shop needs: VARIABLE SPEED LATHE — BELT AND DISC SURFACING MACHINES — SPINDLE SHAPERS — NEW 1½ HP RADIAL SAW — JIG SAWS — SINGLE AND MULTIPLE SPINDLE DRILL PRESSES, BENCH AND FLOOR MODELS — COMPLETE LINE OF MOTORS, TOOLS AND ACCESSORIES

THESE walker-Turner LIGHT-HEAVYWEIGHTS are made to order for School Shops

BUILT to highest industrial standards, every one of these LIGHT-HEAVYWEIGHTS gives the "feel" of sturdy, factory-type production equipment... plus all the accuracy, range, capacity and ease-of-operation that help you do a better teaching job. LIGHT-HEAVYWEIGHTS are "safety-engineered", include all the extra safety features required in today's teaching techniques. They're your most practical school shop investment.

Write us for free Bulletins and Teaching Aids. For quicker action, check the telephone directory for your nearby Walker-Turner Distributor. He's most capable, factory-trained, and thoroughly experienced to help you with your shop equipment problems. Call him—today

WALKER-TURNER
• DIVISION •
KEARNEY AND TRECKER CORPORATION
PLAINFIELD, N. J.

DRILL PRESSES — Hand and Power Feed • RADIAL DRILLS
Wood and Metal Cutting BAND SAWS • TILTING ARBOR SAWS
RADIAL SAWS • JIG SAWS • LATHES • SPINDLE SHAPERS • JOINTERS
BELT AND DISC SURFACERS • FLEXIBLE SHAFT MACHINES
IAVE-11

DRAFTING TABLE BOOK REST

(Continued from page 322)

The white pine shelves and uprights were stained walnut and shellacked. Method of fastening shelf to masonite was three No. 8 by 1¼-in. r.h. wood screws, while the masonite was fastened to the uprights with two No. 6 by 1-in. f.h. wood screws on each end.

Undoubtedly, many improvements, changes, and adaptations could be made to the above idea to fit into many different individual situations.

ARE GLUE JOINTS STRONG

OSCAR H. LEE
Department of Industrial Arts
Walla Walla College
College Place, Wash.

No doubt other instructors of woodshop have been confronted with the same problem as has the writer. The problem of convincing some students, when they first enter woodshop classes, of the strength and value of good glue joints.

Each year there are always a few who do not trust their glue joint work. This is usually for one of two reasons: the student has never made or understood how to make a true joint, or the glue joints which he has come in contact with have been of inferior construction.

The past two years the writer has been making a series of test blocks of different types of wood and of various designs for the materials testing laboratory of our engineering department. After the test blocks have each been pulled apart they are then glued back together. Since the break made by the testing machine is usually a clean break a perfect surface contact is possible for gluing. This perfect surface contact is the point so often missed by the "doubting Thomas" in the construction of his glue joints.

The test blocks are now returned to the testing laboratory to be rebroken. If it is possible for the class to observe the test so much the better. The pounds pressure which was required to break each joint is noted on the blocks. It will always be noticed that the second break is never in the place where the two parts were glued together.

The facts are then pointed out; that if the joint is properly made — square shoulders, flat surfaces, and snug fit, and that the glue is of proper quality, and further that the joint is not starved by applying too great a pressure, the glue joint is really stronger than the original wood fibers.

This method has been used with very good success in helping the new students to understand and appreciate the real strength of well-made glue joints.

Properly constructed glue joints are stronger than the wood itself.

SHELDON
FURNITURE
is Educationally Correct
It's thoroughly thought out; and developed according to the highest standards of structure and design. It's ready for rugged use. Makes your classes run smoother because each piece is designed precisely for the job you want it to do, with the kind of work space you want and the right kind of storage — where you need it.
Call in the Sheldon Man to help you plan.
Sheldon FURNITURE
E. H. SHELDON EQUIPMENT CO., Muskegon, Mich.

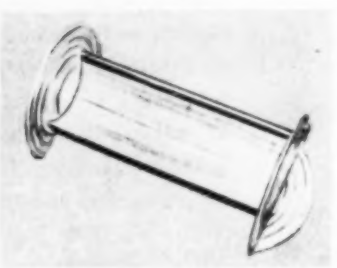
TIN-CAN CHICKEN OR PET FEEDER

J. W. BOLLINGER
Tulsa, Okla.

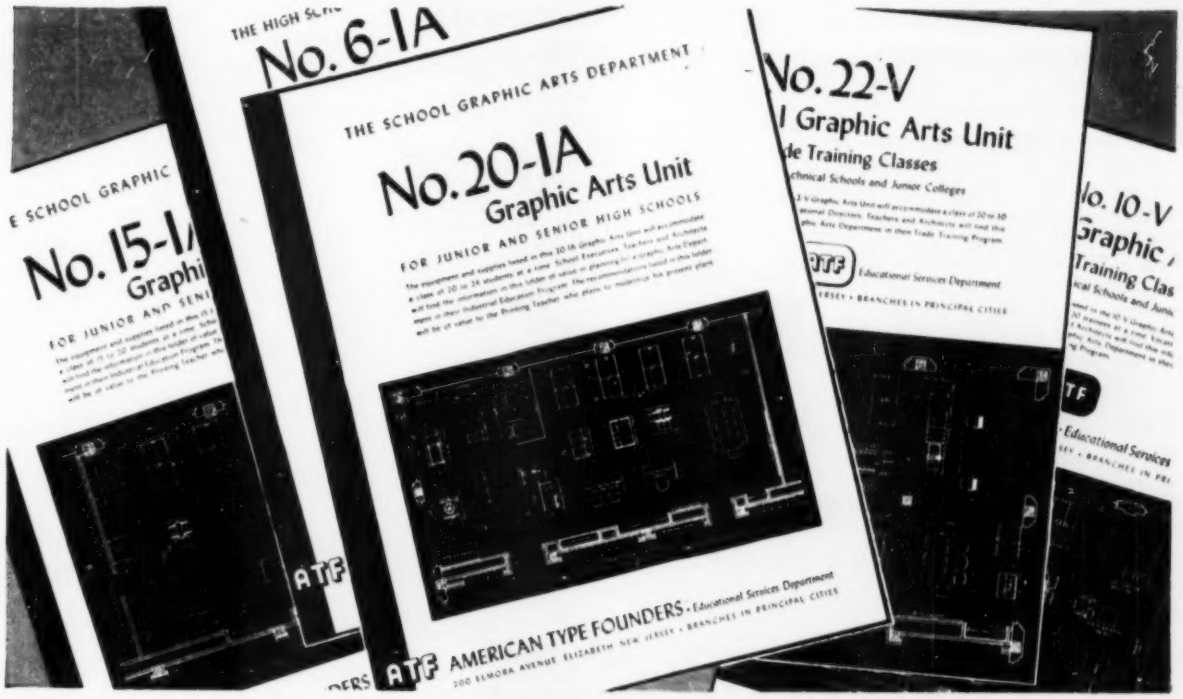
Here is a feeder made out of tin cans, which is very practical, and easy to make, too.

For the end pieces, cut off the bottoms of two large size tin cans. Straighten out the body part of a large tin can; hem the long edges ½ in.; roll to a semicircle on the slip roll former; and solder in place

(Continued on page 24A)



Tin can feeder


No. 6-1A
THE SCHOOL GRAPHIC ARTS DEPARTMENT
No. 20-1A
Graphic Arts Unit
FOR JUNIOR AND SENIOR HIGH SCHOOLS
ATF AMERICAN TYPE FOUNDERS · Educational Services Department
200 ELMORA AVENUE ELIZABETH NEW JERSEY · BRANCHES IN PRINCIPAL CITIES
No. 22-V
Graphic Arts Unit
Training Classes
Educational Services Department

Above are copies of the various folders that are available. The 20 IA Graphic Arts Unit will accommodate from 20 to 24 junior or senior high students.

ATF folders will help you plan your graphic arts department

To help you plan your new graphic arts department or modernize your present shop, ATF offers you seven planning folders based on their more than thirty years experience in graphic arts shop planning.

These folders give suggested layouts, with specs on equipment and supplies for various size industrial arts, junior or senior high schools, colleges and vocational shops. Each plan provides a maximum number of work stations in a given shop area. Folder numbers indicate approximate student load for each plan. One quarter inch scale drawings of layouts are also available.

ATF has a complete line of graphic arts equipment for your school. Write our Educational Services Department for the folder best suited to your needs.

SE.4.3

ATF No. 3-G – 6-G recommends equipment for a graphic arts area in the comprehensive general shop of junior or senior high schools.

ATF BETTER, MORE PROFITABLE PRINTING FROM THE WIDEST LINE OF PROCESSES

Gravure . . . Letterpress . . . Offset

AMERICAN TYPE FOUNDERS
Educational Services Department
200 Elmora Avenue, Elizabeth, New Jersey

Please send me free copies of ATF Educational Folders for

(course)_____(size of class)_____

Name_____

Position_____

School_____

Address_____

City_____ Zone_____ State_____

CHICKEN FEEDER

(Continued from page 22A)

between the two end pieces. Bend a section of the end pieces to make the feet.

Lacquer the feeder with gold bronzing powder, and it might be that the chickens will lay golden eggs!

Larger or smaller, or longer or shorter feeders may be made to suit the wishes of the student.

The feeder may also be used to feed dogs, cats, rabbits, or other pets.

A TIP FOR SHEET-METAL WORKERS

J. H. BAILEY
Central Michigan College
Mt. Pleasant, Mich.

In determining the length of wire necessary for wiring the edge of a circular object — such as a wastebasket — the formula stated in some texts is as follows:

$$L = \pi(D + d)$$

in which L = length of wire
D = diameter of object
d = diameter of wire

I would like to suggest that the following formula be used as it is one that students are already familiar with and requires less figuring on the part of the student:

$$L = C + c$$

L = length of wire
C = circumference of object
c = circumference of wire

In other words, all that is necessary to determine the length of wire needed to wire a circular object is to add the circumference of the wire being used to the circumference of the object being wired. This formula yields the same results as the first one but uses symbols which are already familiar to the student, thus helping him to integrate material learned at an earlier time with learning that is taking place in the sheet-metal shop.

CHECK LIST FOR PLANNING AND EVALUATING TOOL PANELS

PAUL N. WENGER
Chairman, Industrial Arts Department
Teachers College of Connecticut
New Britain, Conn.

1. Tool panels should be located so that they will be as near the center of operations as possible.

2. When designed for the continuous use of a great many students, tool panels should be located at the end of a wide aisle or in an open area which will be relatively free of congestion.

3. The arrangement of tools should be carefully planned and attractively designed so that the finished tool panel will be well balanced and pleasing to the eye. The use of borders or frames is considered quite essential by many designers.

4. The maximum amount of safety should be provided, bearing in mind that:

a) Edges of cutting and piercing tools should be enclosed.

b) Normally, heavy tools and those with dangerous cutting edges should be placed near the bottom of the tool panel.

5. Flat counters, which invite the unauthorized deposit of tools, should not be placed near tool panels. Counters of sufficient slope discourage this type of practice.

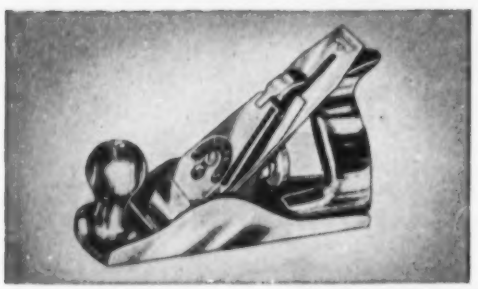
6. Each tool should be clearly identified by a name plate so that students will learn the names of tools through common usage rather than through formal and conscious memorization.

7. The selection of tools should be based upon a study of the frequency of use. Tool panels should not be encumbered by special items which are used rarely or those which are too delicate or too expensive for common usage.

(Continued on page 26A)

No. 75 BLOCK PLANE
For working end-grain surfaces. Invaluable, too, for many light jobs cutting with the grain. Short, light, easily controlled.

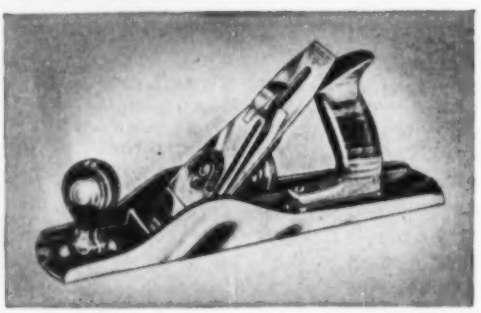
All Favorites



WHEN THEY'RE ALL MILLERS FALLS

No. 9 SMOOTH PLANE
For finishing large surfaces. Improved grip gives more hand room — better balance, control, comfort.

No. 14 JACK PLANE
For edging and all-around use. Quick, easy depth and side adjustments of irons.



Favorites for years with expert craftsmen — Millers Falls Planes are today better than ever in two important ways.

FIRST: All bench models are now equipped with new, scientifically re-shaped handles. The grip is roomier, more comfortable. That means easier handling, better control, less fatigue.

SECOND: All wood parts are now made of colorful Goncalo hardwood — brilliantly grained for new beauty — incredibly durable to withstand a lifetime of rugged use.

In addition, you still get all the time-tested features that have made Millers Falls Planes world famous for accuracy and performance. Write for full details on Millers Falls better-than-ever line of planes for every purpose.

MILLERS FALLS COMPANY
Dept. IA-6 Greenfield, Mass.

MILLERS FALLS TOOLS
SINCE 1868

The Mark of Superiority

This geography class sees and hears its world in true fidelity

Children learn faster—retain longer—when the sights and sounds of the world are presented to them clearly, vividly . . . in the matchless realism of sound movies. And for this geography class, sight and sound are as close to perfection as portable 16mm. projector design has yet made possible.

Their projector is the Kodascope Pageant Sound Projector, Model AV-151—a powerful 15-watt machine with a matched, big-volume, 12-inch speaker. Its separate bass and treble controls . . . its great reserve of output and reproductive capacity . . . and its unique Fidelity Control which makes possible precise focusing of the scanning beam regardless of sound-track position . . . afford matchless control over sound reproduction. And its superb optical system, featuring a built-in "field-sharpening" element, provides visual quality to match the excellence of the sound.

From Belgium to the Orient . . . the sights and sounds of the whole wide world around are crisp, clear, vivid.

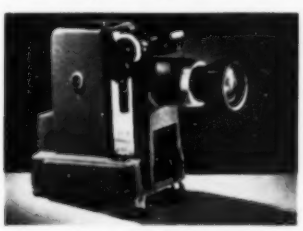
Choice of six brilliant models

The Model AV-151 is one of six Pageant models starting at just $425, a complete line of 16mm. sound and sound-silent projectors that will enable you to meet exactly and easily your particular projection requirements. You can get extra brightness for hard-to-darken rooms . . . extra power and speaker capacity for auditoriums and other acoustically difficult locations . . . flexible controls for the ultimate in sound quality.

And most important, with every Pageant model, you get the matchless convenience . . . the additional mechanism life . . . of permanent pre-lubrication. Kodascope Pageant Sound Projectors are lifetime lubricated at the factory to banish completely the danger of under- or over-oiling—chief cause of projector breakdowns.

Get the story on the complete Pageant line from your Kodak Audio-Visual Dealer. Mail the coupon for his name and address.

Prices subject to change without notice.



new **Kodaslide SIGNET 500 Projector, Filmstrip Model**

It's completely new! And it has the smoothest, surest, fastest film-advance ever designed!

***For brighter, sharper pictures,* it has the Kodak Ektanon Projection Lens (f/3.5 or f/2.8), Lumenized lens-and-condenser system, and aluminized glass reflector. Adapts easily to 2 x 2 slide projector, without extra equipment.**

Only $98 with f/3.5 lens. Ask your dealer to demonstrate its amazing efficiency.

WHAT A-V EXPERTS SAY ABOUT PAGEANT PRE-LUBRICATION

"In spite of all we tell customers about how to oil projectors properly, too many of them never seem to do it right or at all. So it's a welcome relief to be able to offer Kodak's lifetime-lubricated Pageant."

Paul M. King
Krum's Audio-Visual
Battle Creek, Michigan

"Since so many different people—teachers and students alike—operate projectors, proper maintenance is a matter of luck. With permanent lubrication, maintenance is no problem. Anyone who has a Pageant is lucky in more ways than one!"

L. H. Sanborn, *Visual Aid Consultant*
McCurry Foto Co., Sacramento, Cal.

EASTMAN KODAK COMPANY, Dept. 8-V, Rochester 4, N. Y.

Send name of nearest Kodak Audio-Visual Dealer and information on:

- ☐ **Kodascope Pageant Sound Projectors**
- ☐ **Kodaslide Signet 500 Projector, Filmstrip Model**

NAME _____ TITLE _____
ORGANIZATION _____
STREET _____
CITY _____ STATE _____ (Zone)

TOOL PANELS

(Continued from page 24A)

8. Specially designed toolholders should fit specific tools in so far as possible. Students are more likely to return a tool to its proper location if it does not fit into other holders.

9. Toolholders or racks should be made of hardwood, metal, or some other durable material which is selected so as not to damage the tools for which they are designed. Normally, woods of soft texture are unsatisfactory for use on tool panels inasmuch as they become damaged and *toil worn* far too soon, and do not stand up well.

10. Attractive silhouettes, carefully traced outlines, or overlaid templates of tool designs which are exposed when the tool is missing from the tool panel, are helpful in *spotting* missing tools. This practice also facilitates the return of the tools by persons who are not familiar with the arrangement of the tool panel.

11. Tools and tool parts that are dependent upon each other for performing an operation should be placed so that one is in close proximity to the other. For instance, auger bits, screw-driver bits, and countersinks should be located near the braces.

CHALLENGE PRESENTS
CUTTERAMA
Diamond (Hydraulic Clamp) Power Cutter
Diamond (Hand Clamp) Power Cutter
Challenge 370 Automatic (Hydraulic Clamp) Cutter
Challenge 193-265-305 (Hand Clamp) Power Cutter
Challenge 265-305 (Hydraulic Clamp) Power Cutter
Challenge 265-305 Lever Cutter
AN ALL-STAR SHOWING OF AMERICA'S MOST DEPENDABLE LINE OF CUTTERS!

Put yourself in the picture — with a rugged Challenge Paper Cutter that's as right for you as profit itself!

Shown here are some of the fine models that help make Challenge the most extensive and popular line in the country today. In all, there are 7 styles and 6 sizes to choose from, ranging from lever cutters in bench and floor models — to power cutters with hand or hydraulic clamp. Each has been built to one standard of quality — *Challenge quality* — with special emphasis on *safety . . . speed . . . and sureness of operation.*

Yes, the Challenge line of dependable paper cutters is truly panoramic in scope. Every style . . . every size . . . designed to save you time, labor and money — and insure more profitable cutting. Write for full details today. 762

THE CHALLENGE MACHINERY CO.

Office Factories and Show Room: Challenge GRAND HAVEN MICH.

TRADE-MARK ®

Challenge Owns The Printing Equipment Manufacturing Rights of Morgans & Wilcox Manufacturing Co.

TEACHERS' COLLEGES NOT CONFINED TO PREPARING TEACHERS ONLY

J. HOWARD KRAMER

President, Southern State Teachers College

Springfield, S. Dak.

An interesting development which almost approaches a trend is taking place in the teachers' colleges of the Midwest. This applies not only to those colleges which retain the name "teacher" in their titles but also to those which have changed their names to "state college" but whose function is still primarily training teachers.

The thing I am talking about is the tendency or trend for colleges which are primarily considered teachers' colleges to add to their curriculums courses and programs in trade education, not only to prepare teachers to teach trade courses but also to afford terminal courses which are concluded at the end of one or two years to prepare young people for a career in business or provide them with skills whereby they may enter industry.

Survey Made

A recent survey of the teachers' colleges located in North Dakota, Minnesota, Montana, Nebraska, Kansas, Oklahoma, and Missouri showed that most of these institutions have trade education programs.* Twenty-seven colleges whose principal purpose is generally considered as training teachers replied to the questionnaire sent out. Of this number eighteen, 65 per cent or two out of three, are offspring programs that they definitely classified as trade. One of these colleges does not classify its program as trade education but its offerings in industrial arts are so complete that they can lead to either a teaching or trade objective.

All 18 of the institutions having programs other than teacher education were offering business education with business as the vocational objective. Ten were offering courses in welding; 14 offered courses in metals; 9 gave courses in auto mechanics; 8 had programs to train electricians; 10 were offering programs in carpentry; 2 offered printing; 2 upholstering; and 1 radio.

This development seems to be rather surprising to many laymen and it may even come as a surprise to the professional educator. Whether the trend is meritorious or not is probably a matter of opinion. However, the mere fact that

*Since permission has not been obtained from the institutions studied to use their names in any published material, the names are withheld. However, the findings are on file and may be obtained on a confidential basis.

such courses are being included on a vocational objective basis in so many teachers' colleges would indicate not only that trade and teacher education can exist harmoniously side by side but that there is also a demand for the teachers' colleges to do just the thing many of them are doing.

It seems to me that the reasons for this development are three in number:

1. Colleges are now defining their service in terms of areas rather than in terms of a single function.

2. That teachers' colleges are beginning to realize that without too much effort or change they can serve a large number of youth that have too long been forgotten.

3. That democracy has gained another foothold in the realization by college faculties that those who repair our toasters, tune up our automobiles, and build our houses are respectable, too, and that higher education can find a place for them as well as for those who have academic inclinations.

I BELIEVE IN THE UNITED STATES OF AMERICA

It is my home, my country; it is my hope, my concern.

Here I work and rest.
Here I build and dream.

Here is security for my loved ones.

Here my toil is rewarded with an unmatched abundance for my well-being.

Here freedom to live, to think, and to worship is mine, guaranteed by law and our Constitution.

Here I am part of government, able to vote, to serve, and to carry my share of the common load.

God grant me wisdom and strength to safeguard my country's welfare with devotion great enough to measure up to her greatness.

RICHARD J. HOFFMAN, *Chairman, Journalism and Graphic Arts Department, Los Angeles City College, Los Angeles, Calif.*

The government geologist who prophesied in 1919 that our crude oil reserves did not exceed seven billion barrels has missed it by about 69 billion, to date. And today, new reserves of oil are found faster than oil is taken from the ground. — *Petroleum Newsnotes.*

A "mud smeller" in the oil industry is a trained engineer who interprets information brought up by the drill as it probes deep into the earth. — *Petroleum Newsnotes.*

News Notes

♦ The 1954 Industrial Arts Award Contest brought out more than 20,000 school projects in local, state, and regional exhibits.

A total of 712 entrants from 41 states and territories, plus the District of Columbia, were awarded cash prizes.

The national judging finals had to pick the winners out of the 5039 projects which were submitted to them.

♦ Awards honoring the quality of their driver education programs were made to ten states when the board of judges of the Seventh Annual National High School Driver Education Award Program met to announce results for the 1953–54 school year.

Of these, Massachusetts received the Award of Excellence; Arizona, California, Connecticut, Delaware, Oklahoma, and New York, each was given an Award of Honor; and Michigan, Minnesota, Nevada, New Jersey, Ohio, Pennsylvania, Vermont, Virginia, and Wisconsin, all received Awards of Merit.

High ranking states for cash winners and the number of successful entrants were: California, 162; Pennsylvania, 71; Illinois, 64; Ohio, 53; Indiana, 41; Michigan, 40; New York, 32; Texas, 24; Massachusetts, 20; and Wisconsin, 18.

The 712 winners divided $50,000 in award money.

Besides the cash awards, the 30 outstanding award winners and their teachers were given a three-day expense-paid visit to Detroit and Dearborn.

(Continued on next page)

Train with the finest Micrometer made . . .

New LUFKIN BIG BARREL Micrometer

Using new Lufkin Big Barrel Micrometers, your students will have the advantage of learning now on the tool they'll be using on the job in the future. Look at these new features:

1. 18% BIGGER BARREL. Permits bigger, easier-to-read figures and makes more space between markings. Tenths of thousandths are easier to estimate.
2. CHOICE OF FRICTION THIMBLE OR RATCHET CAP. Friction Thimble has built in mechanism that automatically stops further pressure on the measuring faces when correct reading is obtained. The easy-to-reach ratchet cap (illustrated) permits repeated "one-hand" measurements with exactly the same pressure on measuring faces.
3. CHOICE OF SLIP-PROOF BLACK CRACKLE OR SATIN CHROME FINISH ON FRAME. New Black Crackle finish (illustrated) makes the micrometer easiest to handle when hands are oily.
4. NEW TAPERED FRAME AND EXTENDED ANVIL . . . permits measurements in places inaccessible to other micrometers.

FREE Training Aids

HOW TO READ MICROMETER WALL CHART Illustrated wall chart explains the subject in concrete terms. 22 inches wide, 17½ inches high.

"MICROMETER READING MADE EASY" 12 page booklet cleverly illustrated in cartoon style. Tells how to read both thousandths and ten-thousandths, how to care for and adjust micrometers.

BUY LUFKIN TAPES • RULES • PRECISION TOOLS
From Your Regular Source of Supply

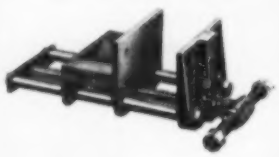
USE COUPON TO ORDER FREE TEACHING AIDS

THE LUFKIN RULE CO., DEPT. VE, SAGINAW, MICH.
Please send me, without charge
_____ "Micrometer Reading Made Easy"
_____ How To Read A Micrometer Wall Chart
☐ New Tools Booklet ☐ Samples of Other Training Aids

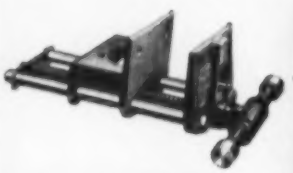
NAME _____
SCHOOL _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

320

MACHINISTS' BENCH
Solid Jaw and Swivel Base



18-A DUAL PURPOSE
WOODWORKING VISE



CONTINUOUS SCREW
WOODWORKING VISE

TAKE YOUR PICK

from the complete
MORGAN LINE

Your School Shop will be better equipped when you specify, and insist on, Morgan Vises. You have your choice of a complete range of sizes and types with Morgan's Woodworkers' (with exclusive tubular steel handle), Machinists', Pipe and Combination Pipe Vises. Every vise UNCONDITIONALLY GUARANTEED.

Write for complete catalogue.

MORGAN
VISE COMPANY
112 N. JEFFERSON ST.
CHICAGO 6, ILLINOIS

NEWS NOTES

(Continued from previous page)

♦ The Model Oil Refinery Kit was developed and produced by Models of Industry, Inc., of Berkeley, Calif., with the technical collaboration of a major oil company.

By building the model oil refinery, learning many of its functions through use of the handbook and performing the classroom experiments, both the theory and practice of oil refining is brought home to the students in a thorough and interesting learn-by-doing manner.

The kit contains all plans and materials needed to build the model refinery and to perform six classroom experiments demonstrating some principles of oil refining. A well-illustrated handbook, written by a classroom teacher, serves as a guide to the construction of the refinery and explains the purpose of each element studied. A teacher's manual offers considerable aid in correlating the over all project.

For further information write *Models of Industry, 2100 — 5th St., Berkeley, Calif.*

♦ Employees of colleges and schools took 38 out of the 191 awards in a national arc welding competition sponsored by The James F. Lincoln Arc Welding Foundation.

A. G. Holmes, Jr., of Mississippi State College, received $500 as a Second Award for his description of how at least $1,000 had been saved in the moving of all machine-shop equipment from an old laboratory to a new laboratory, by using college facilities to construct an electric-welded frame trailer. Kenneth Yager and Charles Feistkorn of the School City of Fort Wayne, jointly shared a $500 award for the description of how they used welding exclusively to rebuild a coal receiving device at a local high school. Max Scanlan, Donald Walters, and Schofield Schwartz, all of Phoenix Union High School and College System, also shared a $500 award for describing the importance of welding in the construction of such major equipment as both portable and fixed outdoor basketball goals, a football field lighting system, and a temporary trash incinerator.

The other 35 awards made to school employees throughout the country ranged from $100 to $25.

♦ The School for American Craftsmen, Division of the Rochester Institute of Technology, Rochester, N. Y., now offers a four-year course in the hand arts leading to the bachelor of science degree. The school also offers a two-year program for which the degree in Associate in Applied Science is given.

Students also are given an opportunity to earn while they learn by marketing their productions.

Instruction is offered in ceramics, metal crafts, jewelry, weaving, textile design, woodworking, and furniture design.

New Publications

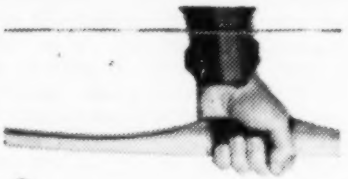
Contemporary Furniture

By A. F. Bick. Cloth, 89 pp., 7 by 10½ in., illus., $2.75. The Bruce Publishing Company, 400 N. Broadway, Milwaukee 1, Wis.

This book on contemporary furniture design is an effort to furnish the student in the school or the worker in the home workshop with designs that do not copy the old period furniture but rather portray the spirit of the present age.

The book contains 42 plates which show

(Continued on page 30A)



for greater accuracy

VENUS...
the drawing pencil preferred by professionals

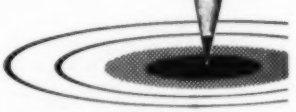
sharper, cleaner lines
... because the lead is homogenized by the exclusive Venus Colloidal Process.* The result: a lead that's uniformly smooth from top to bottom to give perfect drawings or tracings—no smudging, easily erased.

holds point longer
... because Pressure-Proofing* seals lead to the wood along the pencil's entire length. That's why Venus drawing pencils are stronger ... hold a needle point longer.

accurately graded
... thanks to grading by hand. That's why Venus, in all 17 degrees of hardness, gives engineers the consistent grading they need.

Ask for Venus drawing pencils at your favorite store.

*Exclusive Venus patent



VENUS
drawing pencils

with the green crackled finish

Send for helpful, illustrated instruction brochure "Sketching with Venus Pencils," only 25c and get a FREE Venus Drawing Pencil.

American Pencil Co. Dept. IA-11-54
Hoboken, N. J.

Enclosed is 25c for "Sketching with Venus"—and my free Venus Drawing Pencil. Degree I want is ( ).

Name .....

Address .....

City ..... State .....

D/53-4

now . . .

Teach Electricity...EASILY...INEXPENSIVELY

with **CROW ELECTRI-KITS**

Complete VISUAL-EXPERIMENT equipment with coordinated text for Junior High and High School instruction in . . .

- **Electricity for Beginners**
- **Basic Electricity**
- **Advanced Electricity**
- **Electronic Components**
- **Electronic Circuits**
- **DC-AC Motors and Generators**

Here are just a few of the features that make ELECTRI-KITS unique in the technical education field—

1 Students *learn by seeing or doing* . . . they validate electrical principles by constructing their own operating assemblies. Crow method permits students with no mathematical background to grasp the subject readily.

2 Equipment is ready for use immediately in conjunction with your present shop or science courses. No complicated wiring or installation problems . . . no floor space or floor load difficulties.

3 Accompanying each ELECTRI-KIT is a fully illustrated text-manual written in clear non-technical language. It organizes the course for the instructor . . . relieves him of tedious, time-consuming preparation and planning.

4 All parts are precision made and conform to highest engineering standards. They do the work of equipment which, if purchased separately, would cost many times as much, and they do it both safely and accurately.

The Crow method has been acclaimed by hundreds of schools—from the Junior High level to the U. S. Military and Naval Academies—where ELECTRI-KITS are now standard instruction equipment. Here are a few unsolicited comments from users:*

"We find [your units] just as represented, most excellent equipment, and are already using them in the experimental side of our electrical shop work . . . . The instruction manuals are as excellent as the equipment."

". . . I consider your publications and products unique and certainly the finest that I have been able to secure. I wish that the schools I attended had been equipped with them. I believe they fulfill a very great need on the part of the student, that of creating a genuine interest in a very important subject, regardless of his ultimate aim."

**Names will be furnished on request.*

CROW ELECTRI-KIT model 41B *for beginners*

Contains 115 parts for performing 230 fascinating experiments. Guaranteed absolutely safe. Covers permanent magnetism; electromagnetism; circuitry, switches and fuses; transformers; bells, buzzers, relays; thermostats; DC and AC motors and controls. Comes with 284-page, profusely illustrated work-manual. Used successfully by instructors with no electrical training. Complete with hardwood carrying case, Model 41B is priced at only $47.50.

For detailed bulletins about CROW ELECTRI-KITS write

CROW ELECTRI-CRAFT CORPORATION

Div. of Universal Scientific Co., Inc. • BOX 336G, VINCENNES, INDIANA

NEW PUBLICATIONS

(Continued from page 28A)

how to make numerous well-designed pieces of furniture for the homes of the present.

The directions for making and finishing these various pieces of contemporary furniture are explicit and direct. All of the articles shown are pleasing, and in their simplicity will not overtake the students in the junior and senior high school woodworking shops.

General Electricity

By E. W. Jones. Paper, 120 pp., 7¾ by 10¼ in., illus., $1.25. McKnight & McKnight Publishing Co., Bloomington, Ill.

This is an elementary text which will help the beginner to get a good understanding of the electricity so commonly used in our homes today.

The material is written in a simple and direct manner.

Directions also are given for making a table stove, winding coils, a buzzer, a d.c. motor, a toy motor, an electric top, a table lamp, a 60-watt transformer, and a lamp bank.

Textile Fibers and Their Use

By Katharine Paddock Hess. Cloth, 547 pp., 5¾ by 8½ in., illus. J. B. Lippincott Co., Philadelphia, Pa.

A fifth edition of this textbook on textile fibers. The book is divided into three sections, each of which covers from three to seven units describing how fabrics are constructed, how they are classified, and the relationship of the consumer to the textile market.

The book describes by word and picture how fabrics are produced, how the fibers are woven into cloth, how they can be knitted, and how braids, nets, and lace are constructed.

It also shows how materials are dyed, and it describes the natural and synthetic fibers, and also the one mineral fiber — asbestos.

The descriptive material on the synthetic chemical fibers like nylon, Dacron, Orlon, etc., is very interesting.

The Art of Woodturning

By William W. Klenke. Cloth, 186 pp., 5⅞ by 9 in., illus., $3.85. Chas. A. Bennett Co. Inc., Peoria 3, Ill.

An entirely new edition of this excellent book for students and home workshop enthusiasts.

The book explains thoroughly how to do turning on the lathe, what tools and equipment are required, how to grind and sharpen the turning chisels and gauges, and how to do spindle and faceplate turning.

The author also gives directions and detail drawings for making 70 projects which will delight both beginners and advanced craftsmen. The book contains over 200 illustrations.

Specialized Auto Radio Manual

By the Rider Staff. Paper, 208 pp., 8½ by 11 in., illus., $3.

TV Field Service Manual, Vol. 1

By Harold Alsberg. Paper, spiral binding, 128 pp., 5½ by 8½ in., illus., $2.10.

TV Field Service Manual, Vol. 2

By Harold Alsberg. Paper, spiral binding, 160 pp., 5½ by 8½ in., illus., $2.40.

Servicing TV Vertical and Horizontal Output Systems

By Harry E. Thomas. Paper, 176 pp., 5½ by 8½ in., illus., $2.40.

How to Service Tape Recorders

By C. A. Tuthill. Paper, 160 pp., 5½ by 8½ in., illus., $2.90.

The books in the foregoing list are all published by John F. Rider Publisher, Inc., 480 Canal St., New York 13, N. Y. These books are all written up in the thorough manner of the Rider manuals. All are well illustrated and very helpful to those entering or working in the electronics field.

Educators Guide to Free Films — 1954 Edition

Paper, 566 pp., 8½ by 10⅞ in., $6. Educators Progress Service, Randolph, Wis.

This book presents a cyclopedic compilation of information on free educational, informational, and entertainment films.

Each year a completely revised edition is published so that the fresh copy only needs to be preserved. The films are grouped under the following headings: applied arts which embrace such films as pertain to aeronautics, agriculture, business education, home economics (clothing, foods, housing), and industrial arts. Other headings are: fine arts, health education, science, and social studies.

The American Educational Catalog

Revised to February, 1954. R. R. Bowker Co., Publishers, New York City.

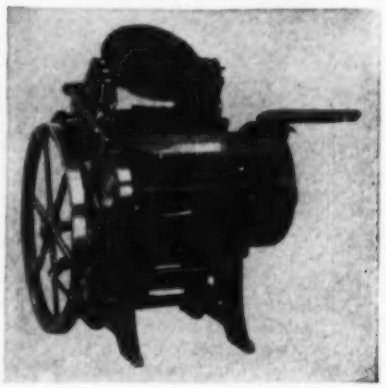
An index of elementary, junior, and senior high school books, classified by subject with supplementary readers, and pedagogical books.

Modern Automotive Engine Repair

By John W. Vale, Jr. Cloth, 177 pp., 6¼ by 9¼ in., illus., $3.20 for the text edition and $4.25 for the trade edition. Prentice-Hall, Inc., New York 11, N. Y.

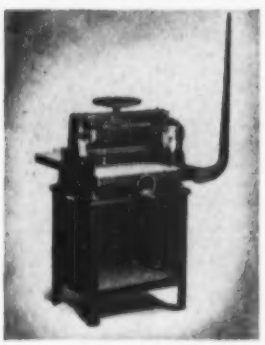
A handy reference book on automobile engine repair for the car owner, the auto

(Continued on page 32A)



C & P NEW SERIES PRESSES These presses in sizes of 8x12, 10x15, 12x18 and 14½x22, provide the student with equipment that furnishes all practical requirements of hand fed press operation. May be equipped with flywheel, belt and platen guards. Also furnished for treadle operation instead of motor drive.

CHANDLER & PRICE
PRESSES and PAPER CUTTERS



C & P BENCH CUTTER An efficient, small size cutter that handles sheets up to 19" x 24". Equipped with two-handed safety control.

The Standard for Printing Education

C & P presses and paper cutters have been standard equipment in commercial plants and schools for over 50 years. So, the selection of C & P equipment for printing classes places before the students *practical* equipment exactly as used in commercial practice in the entire printing industry.

In addition, special safety features are incorporated, when desired, in C & P presses and paper cutters so that all safety requirements are fully satisfied.

For practical instruction—for safety in use—the foresighted administrator recommends . . . Chandler & Price.

"HANDBOOK OF PLATEN PRESSWORK" is one of the outstanding aids to printing furnished without charge to printing instructors. If you do not have a copy, just request one.

C & P PILOT PRESS A thoroughly efficient little press, chase 6½ x 10, that teaches basic principles of press operation with exceptionally fine printing results.

THE CHANDLER & PRICE COMPANY

6000 CARNEGIE AVENUE • CLEVELAND 3, OHIO

you can use
HIGGINS INK
with more
than 30
instruments
HIGGINS INK flows smoothly, dries uniformly, gives fine lines or heavy lines, washes or dense blacks . . . helps you do your best with any instrument, in many techniques — and HIGGINS PEN CLEANER cleans them all!
The Basic Art Medium
Since 1850
HIGGINS INK CO., INC. BROOKLYN, NEW YORK

U. S. BLUE—

The Top Quality Line!

Your Assurance Of Profitable Sales And

ONE DEPENDABLE SOURCE FOR ALL YOUR NEEDS

Drawing Instruments	—	Triangles
Drawing Boards	—	Slide Rules
T Squares	—	Drawing Paper

All The Materials and Instruments Required For Drafting, Drawing And The Industrial Arts.

Write Today For Free Catalog & Price List!

U. S. BLUE PRINT PAPER CO.
111 N. WACKER DRIVE CHICAGO 6, ILL.

FLEX-MASTER

***LIFETIME EFFICIENCY DRAWING TABLE**

makes good your investment

Rigid welded steel stands up under hard use, even abuse. New! Hidden fingertip control adjusts selected soft wood top to any desired working angle. Large all-steel drawer. Hard baked grey Hammertone enamel finish. Drawing surface: 22" x 24". Reference surface: 22" x 10". Also available with undivided top in many sizes. Made in 30" and 37" Heights. Can be furnished with Steel or Hardwood tops.

* LIFETIME STEEL CONSTRUCTION

DEALER INQUIRIES INVITED
Write today for Catalog

Manufacturers of Lifetime Steel Blue Print Filing Cabinets, Drafting Tables, Tracing Tables, etc.

STACOR EQUIPMENT CO.

479 Troy Avenue • Brooklyn 3, New York

NEW PUBLICATIONS

(Continued from page 30A)

mechanic, and the student studying auto mechanics.

The book discusses the automotive engine, lubrication, engine removal and disassembly, inspection and overhaul, engine installation and tune-up, trouble installation and correction, and fits and tolerances.

The appendix presents engine data for different cars.

Educators Guide to Free Slidefilms — Sixth Annual Edition 1954

Compiled and edited by Mary F. Horkheimer and John W. Diffor, M.A. Paper, 209 pp., 8½ by 10⅞ in., $5. Educators Progress Service, Randolph, Wis.

A compilation of free slidefilms from industrial, governmental, and philanthropic organizations.

This edition contains 708 titles, 99 more than last year's. Approximately 50,000 separate frames, pictures, or miniature posters, from 88 different sources are brought to the reader.

The Cupola and Its Operation

By the Cupola Research Committee of the American Foundrymen's Society. Cloth, 332 pp., 8¾ by 11¼ in., illus., $9.50; for members, $6. American Foundrymen's Society, Chicago, Ill.

This is a second revised edition of this encyclopedic book on the cupola. The need for a book such as this becomes quite clear when it is considered that at present 5000 cupolas are operating in the United States and Canada.

The book contains 328 fine illustrations, and 54 tables, plus 702 bibliographic references.

It is divided into four sections which discuss the operation, equipment, materials, and the principles related to the operations pertaining to the cupola.

Mechanical engineers, engineering students, teachers and students of junior high and senior high and technical high schools and institutes, as well as foundrymen, will no doubt, find this book extremely helpful.

The Handbook of Window Display

By Nestor Castro. Cloth, 194 pp., 8 by 11 in., illus., $8.50. Architectural Book Publishing Co. Inc., New York 36, N. Y.

An excellent book for the learner as well as the window display man who has already amassed some experience.

The author starts out with a very good description of perspective and gives practical exercises on perspective rendering. One chapter treats of sprays, scrolls, emblems, and ribbons. Other chapters are on scale drawing, enlarging by squares, lettering, figure drawing, drapes and folds, the handling and draping of mannequins, display fixtures and materials, the use of panels for background, colors and their use, display arrangements and charts, lighting effects, window backgrounds, different types of displays, wire forms, papier-mâché and paper sculpture.

A Dictionary of Linguistics

By Mario A. Pei and Frank Gaynor. Cloth, 238 pp., 5½ by 8¼ in., $6. Philosophical Library, New York, N. Y.

A dictionary of the names, affiliations, and brief descriptions of the past and present major and minor languages and dialects of the world; grammatical terms; and the most frequently used terminology of the field of historical linguistics.

Readings in General Psychology

By Lester D. Crow and Alice Crow. Paper, 437 pp., 5 by 8⅛ in., $1.75. Barnes & Noble, Inc., New York, N. Y.

This book consists of 195 selections from writings of leading psychologists.

The subject matter is discussed in 15 chapters which treat of it under the following headings: nature and scope of psychology; methods in psychology; heredity and environment; sense organs and sensation; perception; attention, retention, and recall; thinking and reasoning; intelligence; behavior drives and attitudes; feeling and emotions; frustration and conflict; personality; and the psychology of occupational adjustment.

The Art of Sign Writing

By B. Hearn. Cloth, 114 pp., 7⅜ by 10 in., illus., $5. Studio Publications, Inc., New York 16, N. Y.

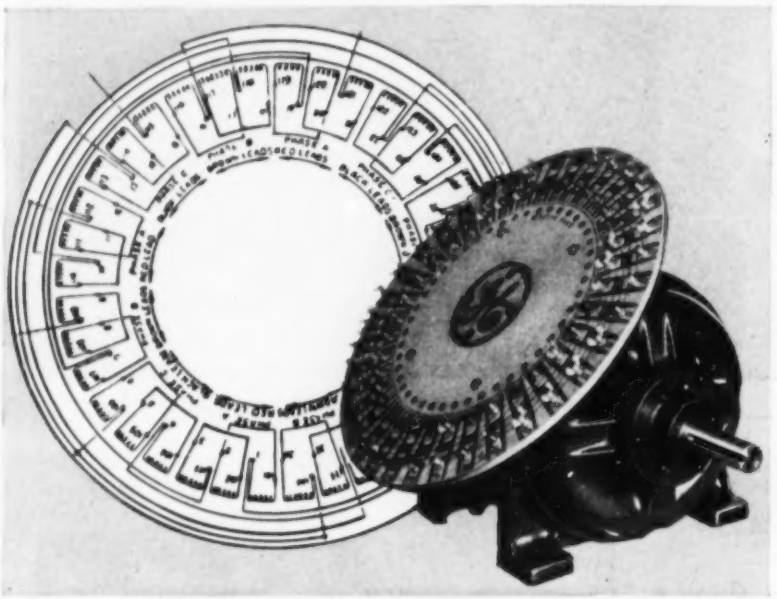
This text is written by a man who has 40 years of practical experience in the art. He wrote this book to help young men who desire to become sign writers and find little opportunity to serve an apprenticeship in this trade subject.

It thoroughly explains what such a beginner must know and leads him through the subject as though he were the author's apprentice.

The book explains what must be known about the brushes, tools, and equipment that is used. Also how backgrounds must be prepared, and presents what preliminary practice in writing must be engaged in. Then it presents various alphabets and shows how they are to be outlined and shaded.

Writing in gold leaf on plain, incised, and raised letters and ornaments is next explained, as is also the planning of layouts, the production of pictorial signs, and the combining of colors.

An interesting chapter describes the history, rules, and principles of heraldry.



Theory and application combined

Study of induction-motor circuits speeded with G-E 72-Terminal Induction Motor

MORE THAN 20 RATINGS are possible with the G-E 72-Terminal Induction Motor. Designed so the student can combine theoretical work with actual practice in selecting circuits for combinations of phase and speed, this equipment allows the student to test various combinations for comparative torque, hp output, efficiency, power factor, and other characteristics.

TEN MOTORS IN ONE is actually what the student has at his disposal since the motor can be wired in the minimum of time for ten different combinations of phase, voltage, and number of poles.

For more information about how the G-E 72-Terminal Induction Motor can help you introduce induction-motor design and connection, contact your nearest G-E Apparatus Sales Office, or write for Bulletin GEC-659 to General Electric Co., Section 688-9, Schenectady 5, N. Y.

YOUR COPY of this 16-page bulletin, GEA-5526, containing information on the specially designed G-E Educational Equipment for electrical laboratories is available on request.

GENERAL ELECTRIC

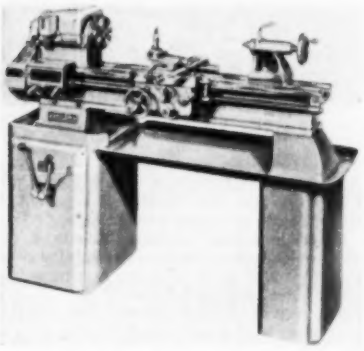
Shop Equipment News

NEW SHELDON 13-IN. UM56P LATHE

The Sheldon Machine Company is featuring a new 13-in. swing Sheldon UM56P lathe with its new pedestal design.

Featuring great operator convenience, this new pedestal mounting for Sheldon lathes is sturdy and functional in design. The heavy cast-iron pedestal fully encloses the motor and drive. The tailstock leg provides a large storage space for the convenient storage of tools and accessories.

This lathe is 34 in. between centers. Other features include the "Zero Precision" tapered roller bearings. These heavy bearings have a single take-up for adjustment and wear, which eliminates costly and time consuming bearing maintenance.



New Sheldon 13-in. UM56P Lathe

The apron is double-walled and has a friction disk-type clutch for engaging with power longitudinal and power cross feeds. Double neoprene cog-V-belts of the spindle provide greater pulling power and longer belt life. The quick change gear box has 54 different threads and pitches. Rapid selection of pitches and feeds can be made while the lathe is running.

For further information write to the *Sheldon Machine Co., Inc., 4258 North Knox Ave., Chicago, Ill.*

(For Convenience Circle Index Code 0901)

DIE-CAST ALUMINUM TORPEDO LEVEL

A new die-cast aluminum torpedo level, which is accurate and shock resistant, is announced by The Columbian Vise & Mfg. Company.

Aluminum Torpedo Level

Known as Columbian 339, the new level has one plumb, one level and one 45-deg. vial. Its top plate is made of attractive red shock-proof plastic. Bottom of the aluminum body is precision-grooved to permit use as a line level, a new Columbian feature.

The new level is 9 in. long, 1⅛ in. high, and only ⅝ in. wide at its widest point. It is adapted for carrying in craftsmen's pockets and is very light.

For further information write to *The Columbian Vise and Mfg. Co., Cleveland 4, Ohio.*

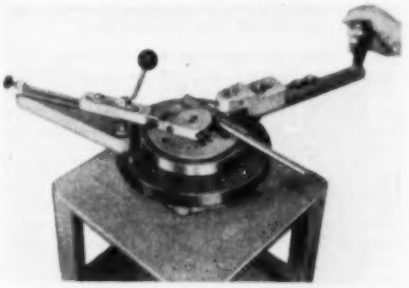
(For Convenience Circle Index Code 0902)

NEW DI-ACRO QUIK-LOK CLAMP

A new clamping device designed for both Di-Acro Benders No. 1 and 1A has been announced by O'Neil-Irwin Mfg. Company.

It is named the Di-Acro Quik-Lok Clamp.

(Continued on next page)



Quik-Lok Clamp holding ¼-in. tubing during forming operation on a No. 1A Di-Acro Bender

Newly Added: **For School Shop Projects:**

SCHWEIZER'S "CAPTAIN'S CASE" - A PRE-FORMED ALUMINUM CONSTRUCTION KIT...

ANOTHER IN THE GROWING SERIES OF SCHOOL SHOP PROVEN ALUMINUM KITS

SCHWEIZER'S "CAPTAIN'S CASE"—KIT #4
An attractive, lightweight traveling companion. Also extremely practical for carrying books, gym clothes, picnic supplies, roller skates, outing equipment and loads of things.

A handsome Overnight Case.—An Excellent Gift

Large Size—13½" x 12" x 5½"
"Captain's Case" Kit #4 Only—$4.25 ea.
Kit includes Pre-Formed Top, Bottom and Ends, All Hardware, Rivets and Rivet Set, Blueprint and Illustrated Instructions.

OTHER SHOP PROJECTS IN ALUMINUM ALL DESIGNED FOR SCHOOL SHOP CLASS.
Kit #1 Basic Utility Case $3.95
Kit #1A Pre-Formed Utility Case 4.25
Kit #2 Basic Antenna (UHF) 2.75
Kit #2A Assembly Antenna (UHF) 3.75
Kit #3 Multipurpose Tray 1.95
Kit #4 Captain's Case 4.25

ECONOMY PLAN
SAVE ON QUANTITY ORDERS. DISCOUNTS APPLY ON ALL KITS. 6–11 Kits 10% off list, 12–35 Kits 15% off list, Over 35 Write In. Each kit complete in every detail, specially designed for school shop projects, Easy-To-Read Blueprints and illustrated instructions teach students authentic sheet metal working techniques as practiced in aircraft plants.

SCHWEIZER

SPONSORSHIP PROGRAM—Request our Sponsorship Plan Details, on how You can have a local businessman sponsor a school shop project. Check coupon below for complete information.

SCHWEIZER AIRCRAFT CORP., Educational Div., Elmira, N. Y.

Send me the following Schweizer Kits:

..... Basic Utility Case Kit #1 @ $3.95
..... Pre-Formed Utility Case Kit #1A @ 4.25
..... Multi-Purpose Tray Kit #3 @ 1.95
..... Basic "Bow Tie" Antenna Kit #2 @ 2.75
..... Assembly "Bow Tie" Antenna Kit #2A @ 3.75
..... Captain's Case Kit #4 @ 4.25

All Prices F.O.B. Elmira, N.Y. Weight: Kit #1, 4½ lbs; Kit #1A, 4½ lbs; Kit #2, 2 lbs; Kit #2A, 2 lbs; Kit #3, 1½ lbs; Kit #4, 2 lbs.

☐ Send FREE booklet "Construction Kits for School Shop Students and Home Craftsmen."
☐ Send full information on local Sponsorship Program for my Shop Class Project.
☐ Check for amount enclosed ☐ Bill the School—Purchase Order #

Name ..... Title .....
Name of School .....
Address ..... City ..... State .....

SHOP EQUIPMENT NEWS

(Continued from previous page)

It is especially valuable when forming tubing, angle, channel, and extrusions on the No. 1 and 1A models of the Di-Acro Bender because it locks the material securely in position and can be instantly released to remove the formed part.

The clamp can be easily adjusted for any radius to 2 in., on the No. 1 model and 6 in. on the No. 1A model, and will handle stainless steel tubing up to ½ in. in diameter, round steel bar up to 5/8 in., as well as many other types of material within the capacity of the No. 1 and 1A benders.

One tube clamp block of specified diameter is included as standard equipment with each Quik-Lok Clamp. Additional clamp blocks also are available.

For further information write to *O'Neill-Irwin Mfg. Co., 544 Eighth Ave., Lake City, Minn.*

(For Convenience Circle Index Code 0903)

NO-GLARE STARRETT STEEL RULES

All the advantages of *Satin Chrome Finish*, pioneered by The L. S. Starrett Company and used on micrometers and other precision measuring tools, are now available on two new Starrett steel rules.

Starrett "Satin Chrome" Steel Rule

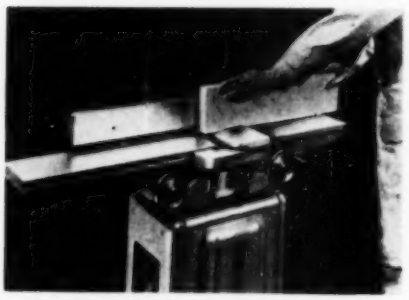
This hard wearing, multi-plate Satin Chrome Finish eliminates glare; makes it easy to read the rule at any angle in any light; speeds up readings; eliminates eyestrain, helps avoid errors. It also resists moisture, acids, perspiration, rust, and stains.

Descriptive folder is available from *The L. S. Starrett Co., Athol, Mass.*

(For Convenience Circle Index Code 0904)

NEW "LONG-BED" DELTA JOINTER

A new "long-bed" 6-in. jointer, introduced by Delta Power Tool Division of Rockwell Manufacturing Company, offers several new time- and cost-saving features for school woodworking shops, and industrial shops, maintenance departments, and shipping rooms.



Delta Long-Bed Jointer

Most important feature of the new tool is a 42½-in. bed that insures a true cut the entire length of a long board.

Other important features include a fully adjustable outfeed table, universal fence control, improved table elevating mechanism and a new safety-engineered guard.

The universal fence control is an additional time saver and is achieved by means of a single control handle which positions the fence for both width and angle of cut. A touch of the finger engages positive stops at 45 or 90 deg. right and left.

For further information write *Delta Power Tool Division of Rockwell Mfg. Co., 435 N. Lexington Ave., Pittsburgh 8, Pa.*

(For Convenience Circle Index Code 0905)

TWO NEW MODELS OF KODASCOPE PAGEANT PROJECTOR

Two improved 16mm. sound-projection models have taken their place among the famous Kodascope Pageant Sound Projectors, and are being marketed by the Eastman Kodak Company.

The new Model 7K2 becomes the standard Pageant sound-silent projector, replacing the old Model 1. Designed for use in homes, small auditoriums and meeting rooms, the

(Continued on page 36A)

Model 7K2 Projector

Will YOU Pass?

Prepare today so that your income will pass the "Living Requirements" test the day you retire. Standard's new "Golden Years" policy makes it possible for you to supplement your retirement income at a guaranteed cost unbeatable by any life insurance company.

LIVE, die, or quit, you and your family will benefit most from Standard Life's great new "Golden Years" Policy —the lowest premium retirement policy of its kind offered by any life insurance company in the world. It's also unique in that the same premium and benefits are given to both male and female policyholders.

If you live to age 65, you receive a handsome retirement income for life . . . or a sum of cash that shows an excellent return on your total premiums deposited.

If death occurs prior to age 65 your beneficiary will receive the face amount. If circumstances force you to discontinue making premium deposits you have your choice of several attractive provisions that produce benefits for you.

Issued in a minimum face amount of $10,000, which provides $100 a month lifetime income at age 65, this policy issued at age 35, for example, is available at the unbelievably low rate of $32.40 a month. Other age levels are equally attractive.

Get all the facts at once from your Standard Life agent . . . or fill in the convenient coupon below—and mail today.

Standard Life

INSURANCE COMPANY OF INDIANA

Washington Blvd. at Fall Creek Indianapolis, Ind.

STANDARD LIFE INSURANCE CO., OF IND. *Indianapolis 5, Ind.*

MAIL THIS COUPON TODAY!

Without obligation on my part, I desire more facts about your "Golden Years" policy and what it will do for me and my family.

*Name*_____ *Age*_____

*Address*_____ *City*_____ *State*_____

• *McKnight Publications*

TEACHING SUCCESSFULLY THE INDUSTRIAL ARTS & VOCATIONAL SUBJECTS

By G. HAROLD SILVIUS & ESTELL H. CURRY. This book contains discussions and suggestions on such important phases of teaching as class organization, planning work, methods and techniques, safety, selection and use of teaching materials, student evaluation and community relations. 340 pages. $4.50

PRACTICAL PARLIAMENTARY PROCEDURE

By ROSE MARIE CRUZAN. Revised 1953 edition covers every phase of parliamentary law. Easily read and understood. Widely adopted as manual in many youth groups. $2.50

SELECTING AN OCCUPATION

By C. A. PROSSER & C. S. SIFFERD. New Edition. New in concept, in organization and in presentation. Contains significant facts about representative types of work. $2.50

VISIT US AT THE AVA — Booth No. 66

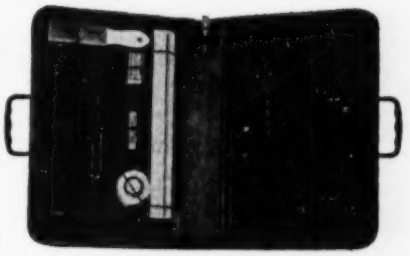
McKNIGHT & McKNIGHT

Dept. 253 • Market & Center Sts. • Bloomington, Illinois

Why so many instructors like students to use BERGER all-in-one drafting kits

Your students are really "present" in class with the Berger Drafting Kit, fully-equipped with every tool they need . . . every day. Sessions get under way promptly . . . no interruptions by students begging the loan of a protractor, a triangle, a scale. You'll find it indispensable as a teaching aid.

Tell your students about the Berger Kit — and tell us how many you need. It costs so little — less than buying the items individually.



PATENT PENDING

BERGER DRAWING SET #512 Nickel-silver master bow pencil; in velvet lined case. Price including complete kit — $8.41.

With interchangeable nickel silver master bow — $9.96.

Prices quoted are for quantities of 6 or more kits. Instructors may buy sample kit at same low price.

YOUR CHOICE OF 8 DIFFERENT TYPE DRAWING SETS — PLUS

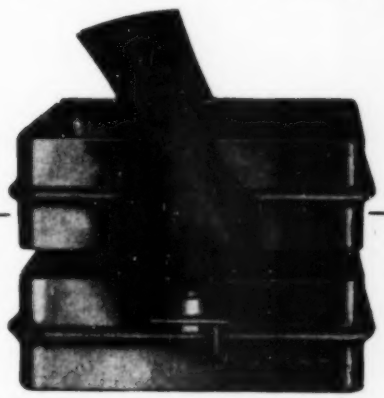
Protractor	French Curve
Architect's Scale	Draftsman's Tape
Engineer's Scale	Pencil Pointer
8" Triangle	2 Drawing Pencils
10" Triangle	2 Erasers

Inner compartments hold drawing and note papers — all in attractive, durable 16" x 24" simulated leather 3-way zippered carrying case of scuff-proof, water-proof Texon with slide-in type handles.

Write for literature and complete prices.

BERGER SCIENTIFIC SUPPLIES, INC.
37 Williams St., Boston 19, Mass.
MATERIALS AND EQUIPMENT FOR ENGINEERS, ARCHITECTS, SURVEYORS AND DRAFTSMEN

USE STERLING STEEL FLASKS For *Easy Handling!*



Sterling Style "E" Flask

You'll find Sterling Style "E" Flasks exceptionally easy to handle because pin lugs are combined with handles. In many foundries, these Style "E" Flasks have replaced snap flasks. They present run outs . . . require less sand.

Sterling Steel Flasks combine maximum strength with minimum weight. They retain their rigidity and accuracy, year-in, year-out. Write for Sterling Catalog.

STERLING WHEELBARROW CO. Milwaukee 14, Wis., U.S.A.

ALL NEW, COMPLETE CATALOG OF WOOD & WOODWORKING EQUIPMENT *FREE* TO INSTRUCTORS

Finest Domestic and Rare Woods . . . Molding . . . Tools ALL AT LOWEST PRICES

INSTRUCTORS! Just mail coupon for your FREE COPY (25¢ to students) of our giant new woodworking catalog. We are America's largest source of fine domestic and rare imported woods for projects. Also bandings, veneers, inlays . . . all shown in full color. Includes over 250 scroll patterns. See newest tools, equipment and hard-to-find cabinet hardware. Rush your request today!

- 148 pages . . . many in full color
- Newest project ideas
- Embossed mouldings, carved ornaments, matched plywoods and veneers
- Same day shipment; guaranteed

CRAFTSMAN WOOD SERVICE CO.
Dept. F-11, 2729 Mary St. Chicago 8, Ill.

CRAFTSMAN WOOD SERVICE CO., Dept. F-11
2729 Mary Street, Chicago 8, Illinois
Send new WOODWORKER'S HANDBOOK — FREE (enclose 25¢ if student)

Name.....
Address.....
City..... Zone..... State.....

SHOP EQUIPMENT NEWS

(Continued from page 34A)

machine offers excellent quality projection for both silent and sound 16mm. films.

They are 7-watt machines with 8-in. speakers built into a single case.

For further information write to *Eastman Kodak Co., Rochester 4, N. Y.*

(For Convenience Circle Index Code 0906)

STUDENT'S DRAFTING KIT

A new economy-size student's drafting kit which combines all essential classroom instruments and materials in one easy-to-carry portfolio case has been introduced by Berger Scientific Supplies, Inc.

Like the larger all-in-one Berger drafting kit, the new Porta-Draft Kit contains a choice of different sets of drawing instruments.

New Berger Porta-Draft Kit

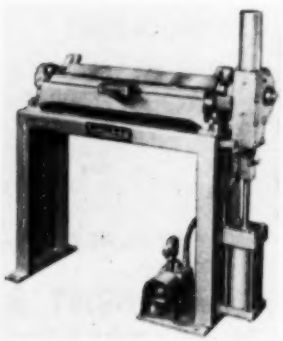
Standard equipment with each kit includes, in addition to the selected set of drawing instruments, a protractor, 12-in. triangular scale, 8-in. triangle (30 to 60-deg.), 6-in. triangle (45 deg. to 90 deg.), French curve, pencil pointer, drawing pencil, and two erasers. Two inner compartments provide carrying space for drawing paper, notes, and blueprints. The carrying case is made of scuffproof, waterproof Texon, and has a 3-way zipper.

For further information write to *Berger Scientific Supplies, Inc., 37 Williams St., Boston 19, Mass.*

(For Convenience Circle Index Code 0907)

NEW AIR ACTUATED BAR FOLDER

A new line of adjustable bar folders, designed and built by Niagara Machine & Tool Works, is air actuated to increase production while reducing operator fatigue.



Air Actuated Bar Folder

These folders may be used for bending or folding sheet metal to an angle or lock in any shop where air is available at pressures from 70 to 80 psi. A foot-operated valve controls the flow of air to the actuating cylinder.

The folders are available in four sizes to handle working lengths from 21 inches to 42 inches and thicknesses of 20 gauge mild steel and lighter. For descriptive literature ask for Bulletin 74-B, *Niagara Machine & Tool Works, 683 Northland Ave., Buffalo 11, N. Y.*

(For Convenience Circle Index Code 0908)

NEW CUTTING ATTACHMENTS AND GAS MIXER

Air Reduction announced the availability of new cutting attachments and a new jet-type mixer which greatly extend the cutting, welding, and heating range of the Airco Style 800 general purpose oxyacetylene torch.

The new jet mixer handles all welding and heating tip sizes with complete flame stability. Sputtering, popping, and flashback are minimized as a result of the modern design features built into this mixer. Rubber sealing rings provide a gastight seal with hand tight-

(Continued on page 38A)

Cutting Attachment and Gas Mixer

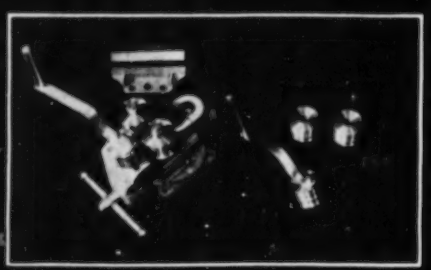
NEW ITEMS
for SCHOOL SHOP INSTRUCTION

ELECTRICAL OR CRAFT BENCH No. E1

A new, modern high efficiency addition to your Industrial Arts Department. Speeds up electrical projects at great savings in time and space. Simply connect the wired strip in the center of the top to your power line, thereby supplying current to many students. Sturdily made, with 2¼" maple top—72" long, 48" wide, 31½" high. 12 Storage drawers for tools, 6 on each side. Immediate delivery.

METL-FORMER KIT

An ingenious combination tool that forms, rolls and bends light metals into ornamental and useful objects. Easily makes such wanted items as —magazine racks, flower pot stands, book holders and many others, all in the modern design. Kit contains Basic Metal Forming Tool, 3 Tubing and Rod Rollers, 3 Flat Metal Rollers, 1 Sheet Metal Bender, 1 Flat Metal Bending Wedge and 2 Roller Handles.



If you haven't received a copy of the new 1954-55 B-G Master Catalog, write for it today.

P.S. Write at once for the November-December LUMBER SPECIAL!

BRODHEAD GARRETT CO.

50 Years Serving School Shops of America

4560 E. 71 ST. CLEVELAND 5, OHIO

EDUCATIONAL
LAMP PROJECTS

Of particular interest to instructors — in woodworking, general shop, plastics, crafts, electricity, and many other shop courses. Students can design and make the body of the lamp. We supply all other parts necessary—sockets, cords, plugs, shades, harps, switches, etc. Over 700 different parts shown in wholesale catalog. A MUST for all instructors occupied with highly educational and useful projects. Send 25¢ today for wholesale price list and parts catalog.

THE GEARON COMPANY
Dept. 100-K11 • 27 S. Desplaines St. • Chicago 6, Ill.

SAVE on Plastics
FOR SCHOOL SHOP PROJECTS!

Colored Plexiglas Assortments
in translucent, opaque and transparent reds, blues, greens, greys, whites and others.
NEW LOW PRICES — IMMEDIATE DELIVERY
10 LBS. $9.50
20 Lbs..... $17.00
40 Lbs..... $30.00
100 Lbs..... $70.00
Finest quality and the best colors in all new, flat, paper-masked Plexiglas. Sizes 6" x 12" and larger in the assortment. Dyes and cements available.

3 FREE BOOKLETS: How to Work With Plexiglas — How to Work With Vinylite — Conversion Table and Chart

Cadillac Plastic Co.
15115 SECOND BLVD.,
DETROIT 3, MICHIGAN

Need Quick Delivery on School Shop Lumber?

• KILN-DRIED • SOFT-TEXTURED

Check your inventory of the species and special items on right. Order what you need now —for quick shipment.

We specialize in School Shop lumber service and can make prompt delivery from our big stocks of ready-to-ship, kiln-dried lumber.

Wherever possible, we ship via commercial trucking lines for fast, dependable, safe, clean delivery.

ASH
BALSA
BASSWOOD
BEECH
BIRCH
CHERRY
CHESTNUT
MAHOGANY
MAPLE
POPLAR
RED CEDAR
WHITE OAK
WILLOW
•
TURNING SQUARES
•
BIRCH DOWELS
•
BASSWOOD DRAWING BOARDS
•
BENCH TOPS

Prices as Shown in Catalog No. 54-S
MAIL US YOUR ORDER TODAY

HARDWOOD CORPORATION OF AMERICA
EDUCATIONAL LUMBER DIVISION
•
ASHEVILLE, N. C.

FREE
BIG NEW ILLUSTRATED
LEATHERCRAFT
CATALOG AND GUIDE

LARSON LEATHERCRAFT FOR CRAFTS CLASSES

- Complete stock for any age or skill
- Careful grading for uniform selection
- Guaranteed quality for best results
- Orders shipped same day received

Whether your leathercraft needs are for Beginners' Kits requiring no tools or experience (for young boys and girls) or fine tooling and carving leathers, accessories and tools (for older, more advanced students) it will pay you to check the new Larson Leathercraft Catalog FIRST. Dependable, guaranteed quality and careful, accurate grading help assure you of consistently excellent results, whatever your leathercraft program may be. Write NOW for your FREE catalog.

J. C. LARSON CO., INC., Dept. 4313, 820 S. Tripp Ave., Chicago 24, Ill.

J. C. LARSON CO., INC., Dept. 4313, 820 S. Tripp Ave., Chicago 24, Ill.
Please send me a FREE copy of your latest Illustrated Catalog and Guide to Leathercraft.

NAME_____

ADDRESS_____

CITY_____ STATE_____

SHOP EQUIPMENT NEWS

(Continued from page 36A)

ening; no wrench is needed, thereby saving valuable time for tip changes.

The new cutting attachments, known as Airco Styles 1800 (medium duty) and 2800 (heavy duty) provide added versatility and cutting range to the Airco 800 torch. The Style 1800 cuts steel up to 6 in. thick and the Style 2800 cuts steel up to 8 in. thick. Standard Airco cutting tips, any one of the tips designed for the Styles 3000 and 9000 hand cutting torches, may be used with the attachments.

For further information write to *Air Reduction Sales Co., Div. of Air Reduction Co., Inc., 60 East 42nd St., New York 17, N. Y.*

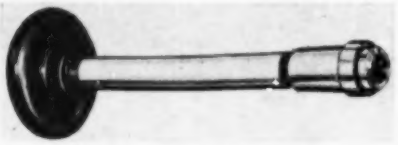
(For Convenience Circle Index Code 0909)

DRAWIN BAR AND COLLET SLEEVE

Drawin Bar and Collet Sleeve attachments for use with their dividing heads have just been developed by L-W Chuck Company. The one, for their 11-in. models BP and AU heads, will take up to a ¾-in. round, standard-type 2L collet; and another, for use with their 6½-in. Model SD head, takes up to a ⅝-in. round, standard-type 4 NS collet.

Prices and literature will be sent to anyone addressing his request to *L-W Chuck Co., 71 S. St. Clair St., Toledo 4, Ohio.*

(For Convenience Circle Index Code 0910)



Drawin Bar and Collet Sleeve

CENTER REAMERS OR COUNTERSINKS

Whitman & Barnes have recently announced that high speed center reamers or countersinks with 90-deg., 100-deg., 110-deg., and 120-deg. included angle are now being furnished at regular prices. Previously only 60-deg. and 82-deg. were standard. Sizes include ¼ to ¾-in. diameter inclusive by ⅛ in.

Whitman and Barnes New Countersinks

For further information write to *Whitman and Barnes, Plymouth, Mich.*

(For Convenience Circle Index Code 0911)

NEW GLUE ANNOUNCED

Poly-Hesive, a new glue of the Poly-Vinyl resin type that is ready to use, quick setting, highly moisture resistant, proof against bacteria, mildew and rot, and very strong now is being distributed by Industrial Craftsmen.

It is nonstaining and requires only a very low clamping pressure to develop maximum strength. It bonds all types of porous surfaces — wood, Masonite, Formica, plastics, china, paper, etc. It is available in 4-oz., pt., qt., gal. and 5-gal. containers, and is an all-purpose glue for hobby and craftwork.

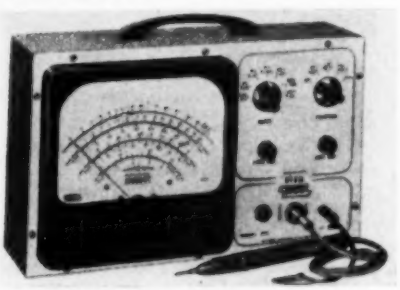
For further information write to *Industrial Craftsmen Inc., 145 High St., Boston, Mass.*

(For Convenience Circle Index Code 0912)

PEAK-TO-PEAK VACUUM TUBE VOLTMETER

EICO announces a new peak-to-peak vacuum tube voltmeter with 7½-in. meter in both kit and wired form.

Expressly designed for TV servicing, EICO's new Model 249 Peak-to-Peak VTVM offers a combination of laboratory precision and versatility.



Peak-to-Peak Vacuum Tube Voltmeter

The new dual purpose a.c./d.c. Uni-Probe (Pat. Pend.) comes complete with either the kit or wired instrument and is a great time-saver; this one probe performs all functions; a half-turn of the probe-tip selects d.c. or a.c. ohms.

Model 249, excellent for bench or field work, features a stable push-pull triode bridge circuit, with accuracy unaffected by line voltage variation. It reads peak-to-peak voltage

Time to Order Your DEK-TUFTS
. . . for professional-looking Classroom Projects EVERY time.
Dek-Tufts have countless uses . . . application is limited only by the extent of the imagination. May be used on walls, cornices, cabinets, cigarette boxes, book cases, tables, picture frames, etc.
And they are . . .
easy to apply
economical
colorful
fire-resistant
washable
rugged
ORDER NOW: As a special offer Dek-Tufts may be purchased by schools at 6¢ per square. Choice of decorator's colors: forest green, lime, gray, red, ivory, beige, tuscan wine and black. A box of threaded matching nails is only 25¢.
Free samples and literature are available to you, as well as instructions for constructing items shown, and many others.
Write Now:
JAYDON, Inc.
482 BROOME STREET, NEW YORK 13, N. Y.

The Best Book?

AMERICAN TECHNICAL SOCIETY'S DRAFTING
Giachino — Beukema
$3.80

APPLIED DRAWING AND SKETCHING
Fleming — Barich — Smith
Paperbound, $3.00
Clothbound, $2.00

CREATIVE MECHANICAL DRAWING — BASIC
Oval S. Harrison
$1.75

Well, actually it's not a question of which is the best book — it's a question of which of these modern texts meets the specific needs of your course. . . .

You'll see that each is excellent in format and content; that each contains the evocative projects which sustain pupil-interest and stimulate desired creative activity. The final choice is your choice. You'll find the book you want, the book your course of study demands, among these three top-grade books. Order them today — on 30-day-approval — and let the books speak for themselves. Or write us about your course and we will make a recommendation.

Gentlemen:
Please send me on 30-days examination the books checked below:

- ☐ AMERICAN TECHNICAL SOCIETY'S DRAFTING
- ☐ APPLIED DRAWING AND SKETCHING
- ☐ CREATIVE MECHANICAL DRAWING — BASIC

Name .....
School .....
Address .....
City ..... State .....

AMERICAN TECHNICAL SOCIETY
Dept. W205
848 East Fifty-Eighth Street
Chicago 37, Illinois

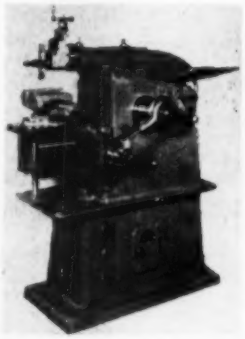
of complex and sine waveforms, rms voltage of sine waves, dv voltage, and resistance. Seven nonskip ranges on every function assure a uniform 3 to 1 scale ratio between adjacent ranges for extreme wide-range accuracy. It provides for center scale zero adjustment for TV¼FM alignment, and for calibration from outside the cabinet. Its 7½-in. meter, electronically protected against burnout, provides extra convenience and legibility.

For further details on this model and the rest of the complete EICO line, write to *Electronic Instrument Co., Inc., 84 Withers St., Brooklyn, N. Y.*

(For Convenience Circle Index Code 0913)

AUSTIN INDUSTRIAL CORPORATION MARKETS PREMA SHAPERS

The Prema Model 02 13-in. Shaper, which is manufactured by A. B. Prema Maskiner, Varnamo, Sweden, is marketed by the Austin Industrial Corporation.



Prema Model 02-13-in. Shaper

These shapers are available in three sizes — 10-, 11-, and 13-in. stroke. They are precision toolroom machines, yet ruggedly built for production work within their capacity. They have solid cast iron bases and one-piece cast iron columns. Drive is by V belt from a 2-h.p. motor, manufactured especially for U. S. service, fully enclosed in the column. A range of six ram speeds from 30 to 150 strokes per minute and six power feeds are provided.

For detailed literature on Prema Shapers write to *Austin Industrial Corp., P. O. Box 430, White Plains, N. Y.*

(For Convenience Circle Index Code 0914)

JOSEPH L. BLOCK AND CHARLES C. JARCHOW ELECTED BOARD MEMBERS

Joseph L. Block, president of Inland Steel Company, and Charles C. Jarchow, president of American Steel Foundries, have been elected members of the board of trustees of Illinois Institute of Technology.

Sixty industrial and business leaders serve as active members of the Illinois Tech board. Five others serve in a retired honorary capacity.

NATIONAL FILMSTRIP AWARD

The Jam Handy Organization received two awards for their educational productions, "Mapstrips — Age of Discovery and Exploration," and "Music Stories," at the National Filmstrip Awards presentation, sponsored by *Scholastic Teacher* magazine, on May 4 at Town Hall Club, New York City.

The filmstrips have been selected by a 35-member panel of audio-visual leaders as two of the ten most notable classroom filmstrips of the year.

5 BIG REASONS to Choose Wenco SCHOOL SHOP FURNITURE & EQUIPMENT

- **DESIGN**
- **CONSTRUCTION**
- **APPEARANCE**
- **DURABILITY**
- **PRICE**

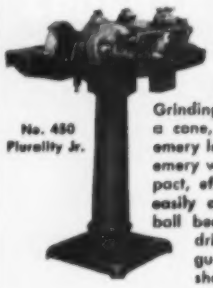
WENCO DRAWING TABLE

The attractive WENCO drawing table will make a big hit with both you and your students. Its durable, solid birch drawing top provides a generous working area of 30" x 30" and is fixed at an angle of 10 degrees. The flat side of the table forms a convenient instrument shelf measuring 12" x 29½". Its sturdy understructure is made of solid oak with draw bolt connections to withstand years of constant use. Designed for maximum working efficiency, this modern WENCO drawing table includes a handy tote drawer — 9" x 16½" x 3½" deep — for instrument and equipment storage.

Send for your free copy of the WENCO Catalog #150.

WESSENDORFF, NELMS & CO.
320 FRANKLIN AVENUE
HOUSTON 13, TEXAS

TOOLS ALWAYS SHARP WITH PLURALITY OILSTONE TOOL GRINDERS



No. 450 Plurality Jr.

NOW AVAILABLE IN 3 SIZES
No. 425 Plurality Sub Jr.
No. 450 Plurality Jr.
No. 475 Plurality

Grinding can be done on a cone, coarse or fine or emery leather stropping or emery wheels. Unit is compact, efficient, serviceable, easily accessible and has ball bearing direct motor drive. Especially guarded for school shop use. Details on request.

MUMMERT-DIXON CO.
HANOVER, PENNSYLVANIA
Originators and Pioneer Manufacturers of Oilstone Tool Grinders

LUMBER FOR SCHOOLS
T. A. FOLEY LUMBER CO.
PARIS, ILL.

GET THE WORLD'S FINEST TOOLS AT BIG SAVINGS

When it comes to equipping the school shop with power tools . . . it makes good sense to LOOK TO MALL FOR THE FINEST. Mall tools are the choice of men who make a living with tools. And now YOU can purchase top quality Mall tools at TREMENDOUS SAVINGS through the Mall School Purchase Plan . . . which applies to any and all of the hundreds of different Mall tools available. Write now.

40 Factory-Owned Service Warehouses, Coast to Coast, To Give You Fast, Dependable Service

MAIL THIS COUPON TODAY

MALL TOOL COMPANY PORTABLE POWER TOOLS GASOLINE—ELECTRIC—AIR
7798 S. Chicago Ave., Chicago 19, Illinois

TELL ME ALL ABOUT THE MALL SCHOOL PURCHASE PLAN

*Name*_____
*School*_____
*Address*_____
IU-116

Descriptive Material

FILM ON TAPS AND DIES

The Greenfield Tap and Die Corporation announces availability to metalworking classes of an educational film, "Facts About Taps and Tapping."

16mm., sound, color, running time 26 minutes, this film covers the nomenclature and function of a tap and its various elements, its proper use and care, and the various types of taps.

Strictly educational, the narration contains no sales talk nor references to the sponsor.

Bookings can be arranged through local distributors or by writing direct to the main office of *The Greenfield Tap and Die Corp., Greenfield, Mass.*

(For Convenience Circle Index Code 0915)

ALLIED RADIO'S 1955 CATALOG

Allied Radio Corporation of Chicago announces the fall release of its new 1955 catalog, No. 140, featuring an unusually large selection of radio, television, and electronics parts and equipment for use in schools, classrooms, laboratories, and shops.

For a copy of this catalog write to *Allied Radio Corp., 100 N. Western Ave., Chicago 80, Ill.*

(For Convenience Circle Index Code 0916)

SOUTH BEND CATALOG NO. 5406

South Bend Lathe's new General Catalog 5406 illustrates, describes, and gives full specifications on their many types, models, and sizes of metalworking machinery used in industrial and vocational training.

Subject matter covers a complete line of precision toolroom lathes and engine lathes, 9 in. through 16–24 in. swings, in bench and floor models, several turret lathe models having ½-in. and 1-in. maximum collet capacities, 14-in. drill presses in bench, floor, and multiple spindle production models, and 7-in. bench shapers.

For your copy write to *South Bend Lathe Works, 425 East Madison St., South Bend 22, Ind.*

(For Convenience Circle Index Code 0917)

TANDY LEATHER COMPANY CATALOG

A brand new and completely revised catalog has just been printed by the Tandy Leather Company.

New precut leathercraft kits — moccasins, handbags, billfolds, etc. — to help the beginner in Leathercraft get started easily and inexpensively. The catalog also contains a very complete listing of leathercraft accessories and supplies.

Several pages of actual instructions ma-

NEW FOR LIMITED BUDGETS for less than one hundred dollars

KIT I — Model 1211 — New Wall Mount Style Electronics Educator

— the same famous *Dumville Electronics Educator* with same fine materials and with identical patented snap fasteners used with deluxe and military units. Model 1111.

WHAT IS THE DIFFERENCE?

To fit the budgets of small schools we are supplying exactly the same kits commended and praised in *Department of Defense* reports on our equipment — and with just as large a mounting surface, 30" x 48" at one third of the price formerly released on Model 1111.

WRITE IN TO FIND HOW YOU TOO MAY NOW BUY FOR YOUR CLASSES
A GENUINE ELECTRONICS EDUCATOR

Manual for Kit I & II for inspection, refundable on order — $2

Address orders and inquiries to Instrument Division

DUMVILLE MFG. CO. Friendship Station
P.O. Box 5595 Washington 16, D. C.
"We teach *circuitry* not *soldering*."

A Century of Service to the Nations' Schools

WEBER ...100th year 1853-1953

DRAWING MATERIALS
DRAWING INSTRUMENTS
DRAFTING ROOM FURNITURE

Descriptive data, on request

F. WEBER CO.
PHILADELPHIA 23, PA.
St. Louis 1, Mo. Baltimore 1, Md.

Patronize Your Nearest Weber Dealer

YOUR STUDENTS Can Easily Make LEATHER CRAFT PROJECTS

If you have not received our new #21 68-page Catalog, which has in it hundreds of Craft items of interest to your Crafts Department, we will be glad to send one to you.

CRAFT PROJECTS • INSTRUCTION BOOKS
PATTERNS • LACINGS • TOOLING LEATHERS
Put-Together Projects for Young and Old.

OSBORN BROS. SUPPLY COMPANY
House of Leathercraft Now in 36th Year
223 W. Jackson Blvd. Dept. C Chicago 6, Ill.

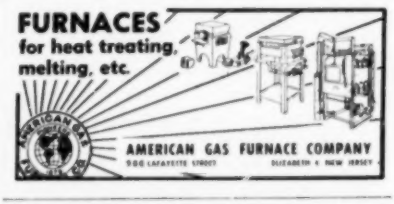
SAVINGS FOR STUDENT AMERICA

SPECIAL #804-6" Master Bow Pencil and Divider. Made of Brass Nickel with extra parts in box. $2.25 ea., $23.00 doz. FREE DELIVERY

Drawing Sets
Drafting Instruments
Designing Aids
Drafting Material
Drawing Equipment
Shop Tools
Craft Supplies

Write for FREE Catalog Today!
MODERN SCHOOL SUPPLIES
For the Graphic and Industrial Arts
P.O. Box 958, Hartford 1, Conn.

FURNACES for heat treating, melting, etc.



AMERICAN GAS FURNACE COMPANY
900 LAFAYETTE STREET ELIZABETH 1, NEW JERSEY

ARTS AND CRAFT SUPPLIES

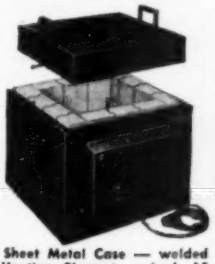
A BUYER'S GUIDE
FOR THE ART AND INDUSTRIAL ART INSTRUCTOR
Send for Our Free
CAREFULLY INDEXED
96 Page Catalogue
LISTING SUPPLIES & REFERENCE MATERIAL IN MOST ALL LINES OF ARTS & CRAFTS

Wood Whittling & Carving - Raffia - Ceramics - Leather - Metal - Jewelry - Shellcraft - Flexcraft - Plasti-Glaze - Textile-Painting - Artists Supplies - Finger-Painting - Block Printing - Knitting - Flytying - Glass Etching - And Many Others.

CRAFTERS of PINE DUNES
MILLER ROAD OOSTBURG, WIS.

Hotpack KILN KIT

EVERYTHING YOU NEED TO MAKE THIS PROFESSIONAL LOOKING ELECTRIC KILN

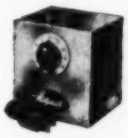


LARGE CHAMBER:
12" deep,
11" wide,
9" high

YOU GET: Illustrated instruction Manual, Insulating Back Up Material, Insulated Cover & Handle, Wire — Screws — Terminal Board, Insulating Brick — cut to size, Sheet Metal Case — welded & painted, Hotpack Heating Elements, wired, 15 amps — 115 volts — Ready to install.

Prices Including Freight and Crating:
East of Denver — $48.00
West of Denver — $55.00

YOU NEVER FORGET to turn off your kiln with the



HOTPACK LIMITOR
Plug-in Type, 115 v. $14.95
Wire-in Type, 220 v. $27.95

WRITE FOR COMPLETE DETAILS

THE ELECTRIC HOTPACK CO., INC.
5067 Cottman St. Philadelphia 35, Pa.

terial make this catalog a handy reference book for any craftsman.

Forty branch stores from coast to coast are all equipped to give faster, more economical mail order service. A complete listing of the stores is to be found on the back page of the catalog.

Get your copy free by writing to *The Tandy Leather Co., 300 Throckmorton St., Fort Worth, Tex.*

(For Convenience Circle Index Code 0918)

NEW ARTS AND CRAFTS CATALOG

The new 48-page catalog just published by the American Handicrafts Company is full of easy-to-learn and profitable hobbies in reed, metal, wrought iron, textile painting, and leathercraft projects.

There are valuable and helpful suggestions and hints for the amateur and professional craftsman throughout the book. The book section has been revised and includes the latest of "how to" books and handicrafts. The new catalog celebrates American Handicrafts' twenty-second year as an arts and crafts supply house in the country. The four locations of the firm's stores are: Hoboken, N. J.; Fort Worth, Tex.; Chicago, Ill.; and New York City.

The new catalog is free. Write to *American Handicrafts Co., 300 Throckmorton St., Ft. Worth, Tex.*

(For Convenience Circle Index Code 0919)

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION MICROFILMED

The 1953 volume of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION has just been microfilmed.

Microfilms of volumes 1949, 1950, 1951, and 1952 also are available.

For further information write to *University Microfilms, Ann Arbor, Mich.*

(For Convenience Circle Index Code 0920)

***Easy! Fun!* FOR STUDENTS TO MAKE REVOLVING FIXTURES with the "pancake flat" *Lazy Susan* BEARING**

3", 6", 12" SIZES

ONLY 5/16" THICK!

Lazy Susan Coffee table

Lazy Susan cupboard shelves

Lazy Susan book case . . . plus many other uses

Making "lazy susan" trays, tables, cupboard shelves and other revolving surface fixtures is easy with Triangle's famous "Lazy Susan" bearing. All steel. Only 5/16" thick. Stamped, interlocked construction. One piece — no parts to lose. Large ball bearing race for maximum stability. Easily mounted with screws or adhesive. 3", 6", 12" sizes. Thousands in use! Satisfaction guaranteed!

Prices each: 3" size — $1.00; 6" — $1.60; 12"—$4.00. Quantity discounts for schools. Postage prepaid in U.S.A. when payment accompanies order.

FOX VALLEY PRODUCTS CO.
168 Pyle St. Dept. IA Oshkosh, Wis.

For Farm Shop Classes:

THE STORY OF ELECTRIC SERVICE FOR THE FARMER

P. R. Rutledge

This book gives a simple and understandable explanation of electricity, and how the power company brings electric service to the farm. In clear and concise language it discusses electric service on the farm; safety devices — what they are and how they operate; how the power company bills for electricity used; the care of motors; etc. Includes handy reference tables giving estimated capacity and average consumption of electrical appliances and farm equipment.

68 pages, paper, saddle stitched.....$1.25

SEND FOR YOUR COPY NOW!

Gentlemen: Date.....

Send me at once THE STORY OF ELECTRIC SERVICE FOR THE FARMER ($1.25).
☐ Bill me. ☐ On Approval.

Ship To: .....

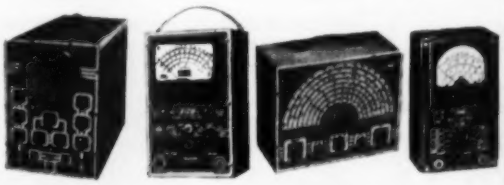
DELMAR PUBLISHERS, INC.
Mountainview Ave. Albany 5, New York

To teach electronics better—at lower cost . . .

MORE SCHOOLS USE EICO KITS & INSTRUMENTS

Here's Why . . .

EICO KITS are top-quality professional TV/radio/electronic test instruments—embody latest performance-proven design and circuitry. Complete with all components, pre-punched chassis, deep-etched aluminum panel, rugged steel case. "Beginner-Tested" step-by-step instructions help the student learn by "doing it himself"—quickening his familiarity with the construction, operation and maintenance of electronic instruments.



425K 5" Push-Pull Oscilloscope KIT $44.95. Wired $79.95.

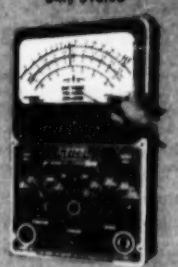
221K Vacuum Tube Voltmeter KIT $25.95. Wired $39.95.

320K RF Signal Generator KIT $19.95. Wired $29.95.

536K 1000 Ohms/Volt Multimeter KIT $12.90. Wired $14.90.

Prices 5% higher on West Coast.

EXCLUSIVE VISUAL TRAINING AID!
Vacuum Tube Voltmeter DYNAMIC DEMONSTRATOR only $10.00



Simulates EICO #221 VTVM in all its functions and ranges. Helps you teach the use and reading of the VTVM with giant 13" meter scale. 14¾" wide x 23" high x 3½" deep. Easily viewed from desk or wall by complete class. Punched holes for easy hanging. Steel cabinet, aluminum panel.

FREE Catalog IV-11 describes EICO's 38 KITS and 42 wired instruments—the industry's most complete line. Write for it now.

EICO®

© 54

ELECTRONIC INSTRUMENT CO., Inc.
84 Withers Street • Brooklyn 11, N. Y.

Leathercraft?

Get Prompt Service from one of the largest stocks of leather, lacing, kits, and accessories in the country. A *Leather Headquarters* since 1910...We specialize in *Complete Service* to schools and hobby groups, whether beginners or advanced, children or adult.

Get Big FREE CATALOG!

52 large fascinating pages, packed with a wealth of instructive and useful information, project ideas, etc. Thousands of items listed. Highest quality, moderately priced. We'll rush a copy—Write to Dept. IA-11.

SAX BROTHERS, INC.
1111 N. 3rd St., Milwaukee 3, Wis. 52 Pages

—LUMBER—

HARDWOODS — NORTHERN & SOUTHERN
FAS — Commons — Shorts
4/4 through 8/4
PINES — SUGAR & PONDEROSA
Clears — Shops — Commons
4/4 through 16/4
ALL LUMBER KILN DRIED
Price List on Request

WORKSHOP SUPPLY & LUMBER COMPANY
P.O. Box 5253 Tulsa, Okla.

KNOCKDOWN CEDAR CHEST
and Aromatic Red Cedar Lumber

Write for Free
Price List Today

GILES & KENDALL CO., Huntsville, Ala.

SAVE ON WOODWORKING SUPPLIES

Plywood cut to your exact specifications without extra charge for special sizes or for packaging. Complete supplies for Craftsmen and Shops. Write for our FREE catalog on plywood, veneers, glues, hardwoods, cabinet hardware, furniture trim, metals, etc.

Minnesota Woodworkers Supply
1713 Olson Highway, Minneapolis 5, Minn.

METAL CRAFTS
Tools, Materials and Supplies

- Hammers, anvils, enamels, etching materials, books and findings.

Send 50¢ for our new catalog 1A. Payment credited on first $3.00 order.

METAL CRAFTS SUPPLY COMPANY
10 Thomas Street Providence, Rhode Island

LAMP PARTS and ELECTRICAL SUPPLIES

Send For FREE Catalogue

Prompt and Courteous Service
Discounts Available

L. H. KASSEL & CO.
208 T & P Terminal Whse. Bldg.
Ft. Worth, Texas

MAKE BOWS AND ARROWS

LARGE STOCK PREPUNCHED LEATHER PROJECT KITS

M-1 FLAT BOW BOOK shows how..$1.05
M-1½ FUN WITH BOW & ARROW.. .31
M-2 LEATHER LACING GUIDE.... .31

Excellent shop and sports project. Postpaid, fast, first class mail. Lots of pictures. 16 pp., 33rd anniversary catalog free.

INDIANHEAD ARCHERY MFG. CO.
Box 303-RP LIMA, OHIO

Machine and Metal Shop TESTED PROJECTS

NEW 60-page Book No. 6 shows working drawings to build machine tools, hand tools and metal projects. The answer for busy, practical instructors. Plans applied in over 2500 schools. Send $1 only.

Also, request FREE Catalog 54-55 of CASTINGS, supplies, equipment

This widened line features high-quality castings and other basic parts for dozens of machine shop projects — at attractive prices.

CASTING SPECIALTIES CO.
Thiensville 4, Wis.

High Grade
Printing Inks

For SCHOOL PRINT SHOPS

COVERWELL INKS FOR QUALITY PRINTING

MARTIN DRISCOLL & CO.
610 Federal St. Chicago, Ill. | Portland, Oregon | 407 E. Michigan St. Milwaukee, Wis.

MAKE SURE YOU HAVE . . . DonJer's New School Catalog of Pre-Selected Project Equipment and Supplies.

HERE IS YOUR DonJer CATALOG

WRITE FOR YOUR FREE COPY

Every item selected with the advice of hundreds of teachers. Every DonJer product is practical, useful and fits into your curriculum.

"SUEDE-TEX" • Golden Touch (23K Gold) • Pearl Essence • Tolemarie • Liquid Marble • Liquid Lumite • Clays • Glazes • Molds • Tackle Box Kits • Liquid Plastics • Amaco Ceramic Supplies • Linoleum Cut-All • Silk Screen and Textile Supplies • Metal Craft Materials • Block Printing Supplies

DONJER PRODUCTS COMPANY
31-41 48th Street Maspeth (L.I.), N.Y.

GLUING WITH HOT GLUE

is practical and economical for school shop and home use. Teach the boys what good glue can do by heating it in Sta-Warm electric glue pots. Cap. 1 to 12 qts. 110 V. A.C. Safe non-burning electric heat. Removable insert with bail brush-wiper, and lid if desired. Specify Sta-Warm glue melters.

Cut-away view showing how heating element completely covers sides and bottom of pot to maintain even heat distribution at low wattage.

STA-WARM ELECTRIC CO.
50 N. Chestnut St. RAVENNA, OHIO

FREE BOOKLET TO INDUSTRIAL ART AND SCHOOL SHOP TEACHERS

Illustrates Fine Imported Tools for Woodworking, Carving, Wood & Linoleum Block Cutting, Cabinet Making. Carpenter Chisels, Gouges, Rasps, etc. Finest West Germany Steel. Hold Keen edges, give lifetime service. Save work. Write Today for Booklet A. — Frank Mittermeier, Exclusive Importer, (Est. 1936) — 3577 E. Tremont Ave., New York 65, N. Y.

CASTINGS

FOR SCHOOL PROJECTS. Build Home Workshop Machines. Designed for ease in machining and as projects for top interest and instruction. Send for descriptive literature on our DEPENDABLE CASTINGS and blue prints.

DESIGNERS COMPANY
724 Monroe Ave. Racine, Wis.

LOOMS, Table and Foot
REED, RAPHIA, HANDICRAFT SUPPLIES

SEND FOR CATALOG

J. L. HAMMETT CO., CAMBRIDGE, MASS.

ELECTRIC HEATING ELEMENTS
for kilns, hot plates, laboratory equipment, special projects.

SEND FOR FREE CATALOGUE

L. E. WHELAN CO.
P.O. Box 752 Hartford, Conn.

FURNITURE

- Metal legs and frames designed by a furniture manufacturer for shop projects . . . create interesting and professional-looking furnishings for home use.

SEND FOR DESIGN FOLDER AND PRICES

PHILLIPS FURNITURE CO.
2564 FON DU LAC • EAST PEORIA, ILLINOIS

PLEXIGLAS

CLEAR — COLORS — SHEETS — RODS — TUBES

McCLARIN PLASTICS
P.O. BOX 168 N HANOVER, PA.
Phone: New Oxford, Pa. 90-J-3

Electro-Typers

Especially qualified to be of service to the school printshop.
Promptness and quality assured.
Forms returned same day received.

Badger - American Electrotype Co.
600 Montgomery Bldg.
407 East Michigan St. Milwaukee, Wis.

INDEX TO ADVERTISERS' PRODUCTS AND SERVICES

Advertisers in this index are given a key number in addition to the page number on which the advertisement appears. Refer to the advertisement for product or services available. Use the business reply card in requesting information from a number of advertisers.

Code No.		Page No.
110	ADJUSTABLE CLAMP COMPANY	18A
111	AMERICAN GAS FURNACE CO.	40A
112	AMERICAN LEAD PENCIL CO.	28A
113	AMERICAN TECHNICAL SOCIETY	39A
114	AMERICAN TYPE FOUNDERS, INC.	23A
115	ARMSTRONG BROS. TOOL CO.	14A
116	ATLAS PRESS COMPANY, THE	10 & 11A
117	BADGER-AMERICAN ELECTROTYPE	42A
118	BERGER SCIENTIFIC SUPPLIES CORP.	35A
119	BOICE-CRANE COMPANY	12A
1110	BRODHEAD-GARRETT COMPANY	36A
1111	BRUCE PUBLISHING COMPANY	3rd cover
1112	CADILLAC PLASTIC CO.	37A
1113	CASTING SPECIALTIES CO.	42A
1114	CHALLENGE MACHINE CO.	26A
1115	CHANDLER & PRICE CO.	33A
1116	CINCINNATI LATHE & TOOL CO.	7A
1117	CRAFTERS OF PINE DUNES	40A
1118	CRAFTSMAN WOOD SERVICE CO.	35A
1119	CROW ELECTRIC-CRAFT CORP.	29A
1120	DEKS, INC.	38A
1121	DELMAR PUBLISHERS	41A
1122	DELTA-ROCKWELL POWER TOOL DIVISION	15A
1123	DESIGNERS COMPANY	42A
1124	DE WALT PRODUCTS CORP.	5A
1125	DIETZGEN COMPANY, EUGENE	2nd cover
1126	DONJER PRODUCTS	42A
1127	DREMEL MFG. CO.	18A
1128	DRISCOLL & CO., MARTIN	42A
1129	DUMVILLE MFG. CO.	40A
1130	EASTMAN KODAK CO.	25A
1131	ELECTRIC HOTPACK COMPANY, INC.	41A
1132	ELECTRONIC INSTRUMENT CO. (ELCO)	41A
1133	FOLEY LUMBER OMPANY, T. A.	40A
1134	FORD MOTOR COMPANY	16A
1135	FOX VALLEY PRODUCTS CO.	41A
1136	GEARON COMPANY, THE	37A
1137	GENERAL ELECTRIC COMPANY	32A
1138	GILES AND KENDALL CO.	42A
1139	HAMMETT COMPANY, J. L.	42A
1140	HARDWOOD CORP. OF AMERICA	37A
1141	HIGGINS INK CO., INC.	31A
1142	INDIANHEAD ARCHERY & MFG. CO.	42A
1143	JAYDON, INC.	38A
1144	JOHNSON GAS APLIANCE CO.	18A
1145	KALAMAZOO TANK & SILO CO.	18A
1146	KASSEL & CO., L. H.	42A
1147	KESTER SOLDER COMPANY	44A
1148	LARSON CO., J. C.	37A
1149	Le BLOND MACHINE TOOL CO., R. K.	4th cover
1150	LOGAN ENGINEERING COMPANY	2A
1151	LUFKIN RULE COMPANY, THE	27A
1152	MALL TOOL COMPANY	40A
1153	Mc CLARIN PLASTICS	42A
1154	McKNIGHT AND McKNIGHT	35A
1155	METAL CRAFTS SUPPLY CO.	42A
1156	MILLERS FALLS COMPANY	24A
1157	MINNESOTA WOODWORKERS SUPPLY	42A
1158	MITTERMEIER, FRANK	42A
1159	MODERN SCHOOL SUPPLIES	40A
1160	MORGAN VISE COMPANY	28A
1161	MUMMERT-DIXON COMPANY	40A
1162	NICHOLS-MORRIS CORPORATION	8A
1163	NICHOLSON FILE COMPANY	20A
1164	NORTHFIELD FOUNDRY & MACHINE CO.	16A
1165	OLIVER MACHINERY CO.	16A
1166	OSBORN BROS. SUPPLY COMPANY	40A
1167	PARKS WOODWORKING MACHINE CO.	14A
1168	PAXTON LUMBER CO., FRANK	12A
1169	PHILLIPS FURNITURE CO.	42A
1170	PITTSBURGH PLATE GLASS CO.	19A
1171	SAX BROS, INC.	42A
1172	SCHWEIZER AIRCRAFT CORP.	33A
1173	SHELDON & COMPANY, E. H.	22A
1174	SHELDON MACHINE CO., INC.	4A
1175	SHOPSMITH	13A
1176	SKIL CORPORATION	9A
1177	SNAP-ON-TOOLS, INC.	12A
1178	SOUTH BEND LATHE WORKS	1A
1179	STANDARD LIFE INSURANCE CO. OF INDIANA	34A
1180	STACOR EQUIPMENT COMPANY	31A
1181	STANLEY TOOLS	17A
1182	STARRETT CO., THE L. S.	6A
1183	STA-WARM ELECTRIC COMPANY	42A
1184	STERLING WHEELBARROW CO.	35A
1185	UNITED STATE BLUE PRINT PAPER COMPANY	31A
1186	WALKER-TURNER DIV.	21A
1187	WALTON CO., INC., THE	14A
1188	WEBER COMPANY, F.	40A
1189	WESSENDORFF, NELMS & CO.	39A
1190	WHELAN COMPANY, L. E.	42A
1191	WORK SHOP SUPPLY AND LUMBER CO.	42A

SHOP EQUIPMENT NEWS

0901	SHELDON MACHINE CO. 13-in. UM56P Lathe	33A
0902	COLUMBIAN VISE AND MFG. CO. Die-Cast Aluminum Torpedo Level	33A
0903	O'NEIL-IRWIN MFG. CO. Di-Arco Quick-Lok Clamp	33A
0904	L. S. STARRETT CO. Starrett "Satin Chrome" Steel Rule	34A
0805	DELTA DIV., ROCKWELL MFG. CO. Delta Long-Bed Jointer	34A
0906	EASTMAN KODAK CO. Model 7K2 Projector	34A
0907	BERGER SCIENTIFIC SUPPLIES CO. Porta-Draft Kit	36A
0908	NIAGARA MACHINE & TOOL WORKS Air Actuated Bar Folder	36A
0909	AIR REDUCTION SALES CO. Cutting Attachment and Gas Mixer	36A
0910	L-W CHUCK CO. Drawin Bar and Collet Sleeve	38A
0911	WHITMAN AND BARNES Center Reamers or Countersinks	38A
0912	INDUSTRIAL CRAFTSMEN, INC. New Glue — Poly-Hesive	38A
0913	ELECTRONIC INSTRUMENT CO. Peak-to-Peak Vacuum Tube Voltmeter	38A
0914	AUSTIN INDUSTRIAL CORP. Prema Model 02 13-in. Shaper	39A
0915	GREENFIELD TAP AND DIE CORP. Film on Taps and Dies	40A
0916	ALLIED RADIO CORP. Catalog No. 140	40A
0917	SOUTH BEND LATHE WORKS Catalog No. 5406	40A
0918	TANDY LEATHER CO. Catalog	40A
0919	AMERICAN HANDICRAFTS CO. Catalog	41A
0920	UNIVERSITY MICROFILMS IAVE Microfilm	41A

USE THESE CARDS ▸

These postage paid cards are provided for the convenience of directors, supervisors, and shop instructors in requesting information on products, services, booklets, and catalogs offered by the advertisers in this issue. See reverse side.

Detach and mail card. No postage required.

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD
First Class Permit No. 1112, Sec. 34.9 P. L. & R., Milwaukee 1, Wis.

Postage Will Be Paid by Addressee

INDUSTRIAL ARTS & VOCATIONAL EDUCATION
P.O. Box No. 2068
MILWAUKEE 1, WISCONSIN

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD
First Class Permit No. 1112, Sec. 34.9 P. L. & R., Milwaukee 1, Wis.

Postage Will Be Paid by Addressee

INDUSTRIAL ARTS & VOCATIONAL EDUCATION
P.O. Box No. 2068
MILWAUKEE 1, WISCONSIN

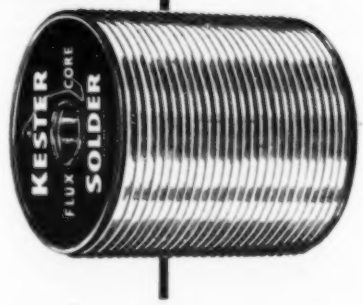
"Maverick" usually spells trouble, in the classroom as well as out on the range. Being an unknown quantity or a "Johnny-come-lately," it leaves room for genuine doubt as to performance and to quality. And that's the reason so many experienced instructors insist upon using Kester Acid-Core Solder and Kester Plastic Rosin-Core Solder or Kester "Resin-Five" Core Solder . . . dependable "brands" for more than 50 years.

DO IT NOW! *Write today for your free copies of the Kester Soldering Manuals . . . the instructor edition and the student edition (tell us how many copies).*

KESTER

SOLDER COMPANY

4205 WRIGHTWOOD AVENUE • CHICAGO 39, ILLINOIS
NEWARK 5, NEW JERSEY • BRANTFORD, CANADA



INDUSTRIAL ARTS AND VOCATIONAL EDUCATION November, 1954
400 North Broadway, Milwaukee 1, Wis.

Please ask the advertiser, indicated by the key number encircled, to send information offered in the advertisement.

110	118	1116	1124	1132	1140	1148	1156	1164	1171	1178	1185
111	119	1117	1125	1133	1141	1149	1157	1165	1172	1179	1186
112	1110	1118	1126	1134	1142	1150	1158	1166	1173	1180	1187
113	1111	1119	1127	1135	1143	1151	1159	1167	1174	1181	1188
114	1112	1120	1128	1136	1144	1152	1160	1168	1175	1182	1189
115	1113	1121	1129	1137	1145	1153	1161	1169	1176	1183	1190
116	1114	1122	1130	1138	1146	1154	1162	1170	1177	1184	1191
117	1115	1123	1131	1139	1147	1155	1163				

NEWS OF PRODUCTS FOR THE SCHOOLS

0901	0903	0905	0907	0909	0911	0913	0915	0917	0918	0919	0920
0902	0904	0906	0908	0910	0912	0914	0916				

Name _____ Position _____

School _____

Address _____

City _____ Zone _____ State _____

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION November, 1954
400 North Broadway, Milwaukee 1, Wis.

Please ask the advertiser, indicated by the key number encircled, to send information offered in the advertisement.

110	118	1116	1124	1132	1140	1148	1156	1164	1171	1178	1185
111	119	1117	1125	1133	1141	1149	1157	1165	1172	1179	1186
112	1110	1118	1126	1134	1142	1150	1158	1166	1173	1180	1187
113	1111	1119	1127	1135	1143	1151	1159	1167	1174	1181	1188
114	1112	1120	1128	1136	1144	1152	1160	1168	1175	1182	1189
115	1113	1121	1129	1137	1145	1153	1161	1169	1176	1183	1190
116	1114	1122	1130	1138	1146	1154	1162	1170	1177	1184	1191
117	1115	1123	1131	1139	1147	1155	1163				

NEWS OF PRODUCTS FOR THE SCHOOLS

0901	0903	0905	0907	0909	0911	0913	0915	0917	0918	0919	0920
0902	0904	0906	0908	0910	0912	0914	0916				

Name _____ Position _____

School _____

Address _____

City _____ Zone _____ State _____

To Aid the School Shop Teacher

***ANNOUNCING* . . . A New Guide to Production Techniques**

INDUSTRIAL TECHNIQUES IN THE SCHOOL

By Irwin Sexton

This new supplementary book presents the fundamentals of mass production work and supplies skillfully selected production-line projects. Part one discusses the theories of production planning, quality control, time and motion studies, job evaluation, jig and fixture development, material handling, etc. Section two offers 16 projects which demonstrate the basic operations of production work. A unique and practical guide to help the industrial arts instructor introduce his students to the production line techniques of modern industry.

Ready in December

THE SUPERVISION OF INDUSTRIAL ARTS

By William A. Bakamis

A new, complete professional manual for industrial arts administrators. Extremely practical in its approach, it covers every phase of supervision from educational beginnings to the most modern evaluation, planning, and organizational techniques. Includes chapters on shop supply management, supervisory bulletins, selection of teachers, constructing study courses, and many others.

$3.00

TRADE AND JOB ANALYSIS

By Verne C. Fryklund

How to organize and teach technical subjects, trade subjects, and industrial skills in the most efficient manner is the subject of this scientific guide for all teachers of industrial arts.

$2.00

SCHOOL-SHOP ADMINISTRATION

By Arthur B Mays and Carl H. Casburg

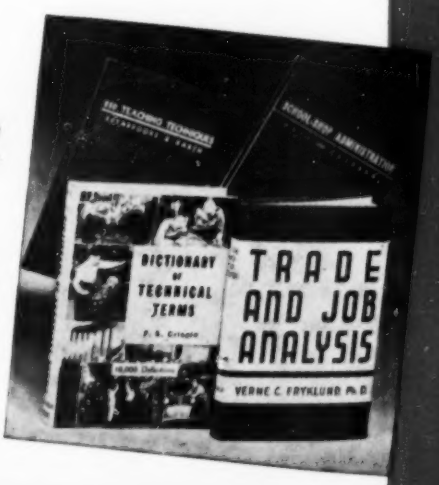
A comprehensive overview of the administrative side of the school-shop, recently revised to feature up-to-date advice on typical modern shop problems.

$2.50

Send for your examination copies of the above books on our 30-day study plan!

Be sure to visit our exhibit at the 1955 AVA convention (Booth 141)

THE BRUCE PUBLISHING CO.
711 Bruce Building
Milwaukee 1, Wisconsin



PROFESSIONAL BOOKS

250 TEACHING TECHNIQUES

By Edward C. Estabrooke and R. Randolph Karch

Practical discussion of the elements of good instruction: the qualities of a good instructor, the conducting of shop activities, the planning and presenting of a lesson, etc.

$1.75

LEADERS IN INDUSTRIAL EDUCATION

By William T. Bawden

Short biographies of nine prominent men in the industrial educational field. Includes chapters on the contributions of Calvin Woodward, Charles Richards, Ira Griffith, John Runkle, and James Stout.

$3.00

HOW TO READ STATISTICS

By R. L. C. Butsch

A non-technical coverage of the meaning and interpretation of statistics for anyone who works with educational studies.

$2.50

DICTIONARY OF TECHNICAL TERMS

By Frederic S. Crispin

Recently revised to include all necessary television terms, this handy book contains classifications and terms used in the most trades and crafts, and in related arts and sciences.

$4.75

TEACHING WITH FILMS

By George H. Fern and Eldon B. Robbins

All the practical information relative to the effective use of instructional films (including film strips) with special application to the field of industrial arts.

$2.25

Turning Terminology

(as visualized by Tom the Trainee)

"FEEDING THE CROSS-SCREW"

"D-d-down boy!", stammers Tom, as he envisions this hair-raising ordeal. He'll have a good laugh on himself when he discovers how easy it is to "feed the cross-screw" on a LeBlond Regal—and safe, too. He'll learn all the big-lathe operations on this versatile machine, specially designed to help you prepare him thoroughly for his future job in industry.

Geared headstock—Power is transmitted efficiently at eight conveniently selected speeds.

Quick-change box—56 feeds and threads can be chosen simply through this foolproof mechanism.

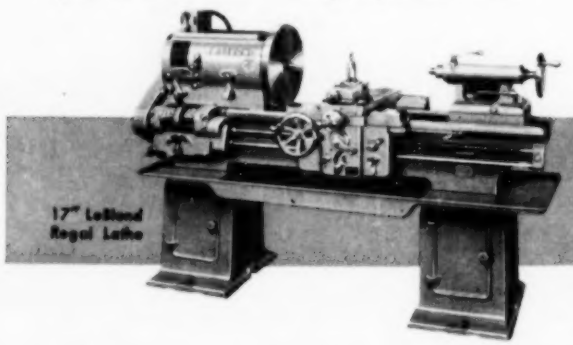
Leadscrew and feed rod—Both are provided to give you accurate thread-chasing, dependable feeds.

American Standard taper spindle nose—For safe, rugged, accurate positioning of chucks and faceplates.

One-piece apron—Long-life sturdiness and protection from dirt are built into the double-wall apron.

LeBlond Regals are extra rugged, require little maintenance, simplify shop training - give you big - lathe features at low cost. Available in 13", 15", 17", 19", 21" and 24" sizes and in a 13" bench model. Write today for the complete story on these ideal training lathes.

THE R. K. LeBLOND MACHINE TOOL CO.
CINCINNATI 8, OHIO



LeBLOND *of Cincinnati*

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES